Ratio

UNIT ONE

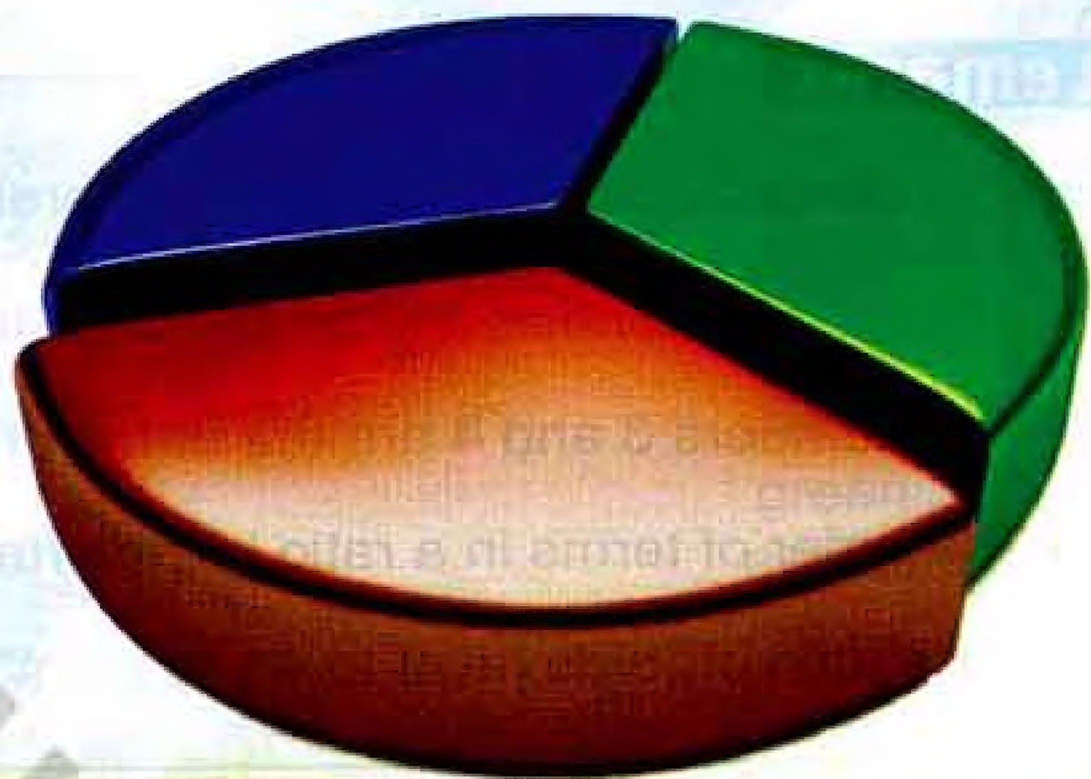




Lessons of the unit :

1. Meaning of ratio and its properties.
2. Follow : Properties of ratio.
3. Miscellaneous exercises on ratio and its properties.
4. Ratio among three numbers.
5. Ratio applications (Rates).

⊙ **Unit test.**



Lesson 1

Meaning of ratio and its properties

The meaning of ratio

A ratio is a way of comparing between two quantities by division.

For example :



Maged wanted to paint a wall using a light blue paint.

To get the colour of this paint , he mixed 3 kg. of white paint to 4 kg. of blue paint.

The ratio of "white paint to blue paint" is "3 to 4" , which means that :

For every 3 parts of white paint , he needs 4 parts of blue paint.

White paint	☐☐☐	3 parts
Blue paint	☐☐☐☐	4 parts

Lesson 1

Remarks

- You can write this ratio in three different ways :

3 to 4 $\frac{3}{4}$ 3 : 4

- The numbers 3 and 4 are the terms of the ratio.
- The order of terms in a ratio is important.

(The ratio of "blue paint to white paint" is 4 to 3 , $\frac{4}{3}$ or 4 : 3)

Ratio of two numbers

$$\text{The ratio of two numbers} = \frac{\text{The first number}}{\text{The second number}}$$

For example :

The ratio between 5 and 3 is $\frac{5}{3}$

- 5 is the first term (or antecedent).
- 3 is the second term (or consequent).

Example 1



In the opposite figure :

There are 3 red apples and 2 green apples.

Write each ratio in all three forms :

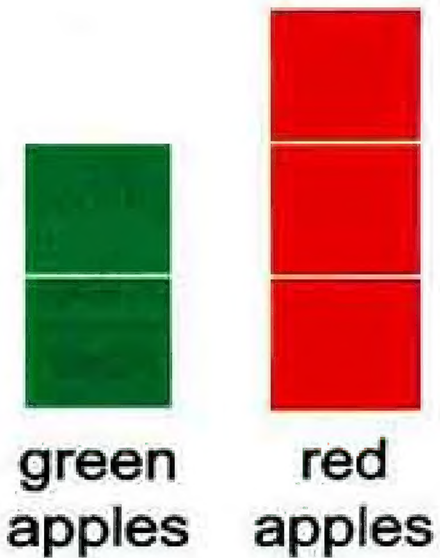
[a] Number of red apples to number of green apples.

[b] Number of green apples to number of red apples.

[c] Number of green apples to number of all apples.

[d] Number of red apples to number of all apples.

Solution



[a] $\frac{\text{Number of red apples}}{\text{Number of green apples}} = \frac{3}{2}$

The ratio between the number of red apples and the number of green apples can be written as :

$\frac{3}{2}$, 3 to 2 or 3 : 2

[b] $\frac{\text{Number of green apples}}{\text{Number of red apples}} = \frac{2}{3}$

The ratio between the number of green apples and the number of red apples can be written as :

$\frac{2}{3}$, 2 to 3 or 2 : 3

[c] $\frac{\text{Number of green apples}}{\text{Number of all apples}} = \frac{2}{5}$

The ratio between the number of green apples and the number of all apples can be written as :

$\frac{2}{5}$, 2 to 5 or 2 : 5

[d] $\frac{\text{Number of red apples}}{\text{Number of all apples}} = \frac{3}{5}$

The ratio between the number of red apples and the number of all apples can be written as :

$\frac{3}{5}$, 3 to 5 or 3 : 5

Notice that :

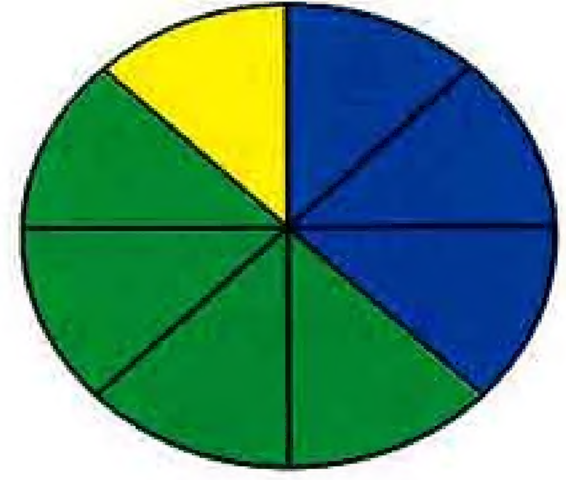
$\frac{\text{Number of green apples}}{\text{Number of red apples}} = \frac{2}{3}$

This means :

Number of green apples = $\frac{2}{3}$ number of red apples

Lesson 1

Try by yourself



Look at the opposite figure, then complete each of the following :

[a] $\frac{\text{Number of blue units}}{\text{Number of green units}} = \frac{\dots\dots}{\dots\dots}$

[b] $\frac{\text{Number of yellow units}}{\text{Number of blue units}} = \frac{\dots\dots}{\dots\dots}$

[c] Number of green units : number of yellow units = ... : ....

[d] Number of blue units : number of all units = ... : ....

[e] Number of yellow units = $\frac{\dots\dots}{\dots\dots}$ number of green units.

[f] Number of green units = $\frac{\dots\dots}{\dots\dots}$ number of all units.

The properties of ratio

Property (1)

The ratio has the same properties of the fraction as reduction , simplifying and comparison.

Property (2)

In its simplest form , the two terms of the ratio should be two whole numbers as small as possible.

Remark

To write a ratio in its simplest form , you should remember some of the rules of divisibility which you studied before.

A number is divisible by :

- 2 if its units digit is 0 , 2 , 4 , 6 or 8
- 3 if the sum of its digits is divisible by 3
- 5 if its units digit is 0 or 5

Example 2

Write each of the following ratios in its simplest form :

[a] 25 : 45
[b] 30 : 20
[c] 48 : 18
[d] 2800 : 3500

Solution

[a] 25 : 45 (÷ 5)
5 : 9

[b] 30 : 20 (÷ 2)
15 : 10 (÷ 5)
3 : 2

Another solution

- You can solve by dividing the two terms of the ratio by their H.C.F.
- 10 is H.C.F. between 30 and 20

30 : 20 (÷ 10)
3 : 2

[c] 48 : 18 (÷ 2)
24 : 9 (÷ 3)
8 : 3

Another solution

6 is H.C.F. between 48 and 18

48 : 18 (÷ 6)
8 : 3

[d] 2800 : 3500 (÷ 100)
28 : 35 (÷ 7)
4 : 5

Example 3

Write the ratio between the two numbers in each of the following in its simplest form :

[a] 0.4 : 0.16

[b] 1.4 : 42

Solution

[a] 0.4 : 0.16 (× 100)

(to cancel the decimal point)

40 : 16 (÷ 8)

5 : 2

[b] 1.4 : 42 (× 10)

14 : 420 (÷ 2)

7 : 210 (÷ 7)

1 : 30

Example 4

Find each of the following ratios in its simplest form :

[a] $\frac{5}{7} : \frac{3}{4}$

[b] $1\frac{2}{3} : 2\frac{1}{2}$

[c] $1\frac{1}{4} : 1.75$

[d] $2 : \frac{1}{5}$

Solution

[a] $\frac{5}{7} : \frac{3}{4}$ (× 28)

(because L.C.M. of 7 and 4 is 28)

$\frac{5}{\cancel{7}_1} \times \cancel{28}^4 : \frac{3}{\cancel{4}_1} \times \cancel{28}^7$

20 : 21

Another solution

$\frac{5}{7} : \frac{3}{4}$

$= \frac{5}{7} \div \frac{3}{4}$

$= \frac{5}{7} \times \frac{4}{3} = \frac{20}{21}$

or 20 : 21

[b] $1\frac{2}{3} : 2\frac{1}{2}$

(change into improper fractions)

$\frac{5}{3} : \frac{5}{2}$ (× 6)

$\frac{5}{\cancel{3}_1} \times \cancel{6}^2 : \frac{5}{\cancel{2}_1} \times \cancel{6}^3$

10 : 15 (÷ 5)

2 : 3

Another solution

$1\frac{2}{3} : 2\frac{1}{2}$

$= 1\frac{2}{3} \div 2\frac{1}{2}$

$= \frac{5}{3} \div \frac{5}{2}$

$= \frac{\cancel{5}}{3} \times \frac{2}{\cancel{5}} = \frac{2}{3}$

or 2 : 3

[c] $1\frac{1}{4} : 1.75$

(change into improper fractions)

$\frac{5}{4} : \frac{175}{100}$ (× 100)

$\frac{5}{4} \times 100 : \frac{175}{100} \times 100$ (cancelling: 4 → 1, 100 → 25)

125 : 175 (÷ 5)

25 : 35 (÷ 5)

5 : 7

Another solution

$1\frac{1}{4} : 1.75$

$= 1\frac{1}{4} \div 1\frac{3}{4}$

$= \frac{5}{4} \div \frac{7}{4}$

$= \frac{5}{4} \times \frac{4}{7} = \frac{5}{7}$

or 5 : 7

[d] $\frac{2}{1} : \frac{1}{5}$ (× 5)

(because L.C.M. of 1 and 5 is 5)

$\frac{2}{1} \times 5 : \frac{1}{5} \times 5$ (cancelling: 5 → 1, 5 → 1)

10 : 1

Another solution

$2 \div \frac{1}{5}$

$= 2 \times \frac{5}{1} = \frac{10}{1}$

or 10 : 1

Try by yourself

Write each of the following ratios in its simplest form :

[a] 15 : 25 [b] 2.4 : 4.8 [c] $\frac{3}{4} : \frac{1}{6}$ [d] $6\frac{2}{3} : 4.5$

Example 5

Compare the two ratios $\frac{4}{5}$ and $\frac{3}{4}$

Solution

We should get the L.C.M. of the denominators which is 20 , then the two ratios become : $\frac{16}{20}$, $\frac{15}{20}$

We know that : $\frac{16}{20} > \frac{15}{20}$

, then $\frac{4}{5} > \frac{3}{4}$

Notes

The comparing of two ratios is the same way of comparing of two fractions.

Try by yourself

Compare the two ratios $\frac{3}{5}$ and $\frac{5}{9}$



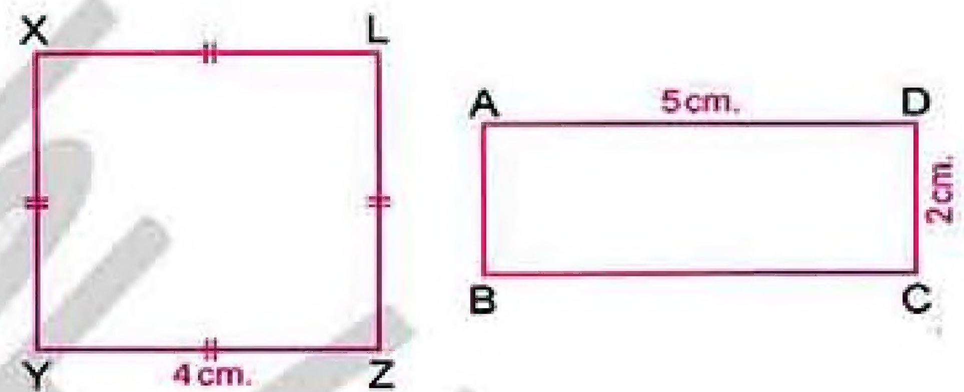
1 Lesson

Remember that :

1. The perimeter of the square = side length × 4 = S × 4
2. The area of the square = side length × itself = S × S
   or the area of the square = $\frac{1}{2}$ The length of its diagonal × itself
   $= \frac{1}{2} \times d \times d$
3. The perimeter of the rectangle = (length + width) × 2 = (ℓ + w) × 2
4. The area of the rectangle = length × width = ℓ × w
5. The circumference of the circle = 2 π r = d π

Example 6

From the opposite figures , complete the following :



[a] The perimeter of the square XYZL = ... = ... cm.

[b] The perimeter of the rectangle ABCD = ... = ... cm.

[c] The ratio between the square perimeter and the rectangle perimeter = ... : .... = ... : ....

[d] The area of the square = ... = ... cm^2

[e] The area of the rectangle = ... = ... cm^2

[f] $\frac{\text{The area of the rectangle}}{\text{The area of the square}} = \frac{.........}{.........} = \frac{.........}{.........}$ or .... : ....

[g] The side length of the square : the perimeter of the square = ... : .... = ... : ....

Solution

[a] 4 × 4 = 16

[b] (5 + 2) × 2 = 14

[c] 16 : 14 = 8 : 7

[d] 4 × 4 = 16

[e] 5 × 2 = 10

[f] $\frac{10}{16} = \frac{5}{8}$ or 5 : 8

[g] 4 : 16 = 1 : 4

Remarks

1. In an equilateral triangle, the ratio of the side length to the perimeter is 1 : 3
2. In a square, the ratio of the side length to the perimeter is 1 : 4
3. In a square, the ratio of any side length to another side length is 1 : 1
4. In a rhombus, the ratio of any side length to another side length is 1 : 1
5. In a circle, the ratio of the diameter length to the circumference is $2r : 2\pi r$ (which equals $1 : \pi$)
6. In a circle, the ratio of the radius length to the circumference is $r : 2\pi r$ (which equals $1 : 2\pi$)

Exercise 1 Meaning of ratio and its properties

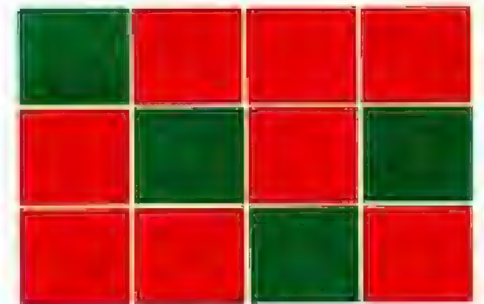

Solve Exercise

From the school book

1 Complete the following table :

First term (antecedent)	Second term (consequent)	Two ways of writing
2	3	$\frac{\cdots}{\cdots}$ or 2 : 3
3	7	.... or ....
....	....	$\frac{4}{5}$ or ....
....	....	.... or 8 : 7

2 By using the opposite figure , complete the following :

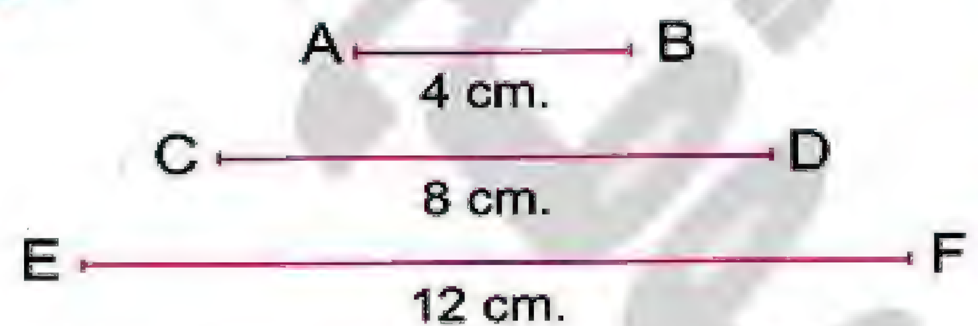


(a) The ratio between the number of the green squares to the total number of squares in the simplest form equals .... : ....

(b) The ratio between the number of orange squares to the total number of squares in the simplest form equals .... : ....

(c) The ratio between the number of orange squares to the number of green squares in the simplest form equals .... : ....

3 By using the opposite figure , complete :



(a) $\frac{\text{the length of } \overline{AB}}{\text{the length of } \overline{CD}} = \frac{\cdots}{\cdots}$ (in the simplest form)

(b) $\frac{\text{the length of } \overline{EF}}{\text{the length of } \overline{CD}} = \frac{\cdots}{\cdots}$ (in the simplest form)

(c) The length of $\overline{EF}$ = 3 times the length of ....

(d) The length of $\overline{CD}$ = ... the length of $\overline{EF}$

4 Write each of the following ratios in its simplest form :

(a) 6 : 8 (b) 15 : 24 (c) 27 : 36 (d) 21 : 9

(e) 7 : 21 (f) 25 : 75 (g) 55 : 121 (h) 500 : 700

(i) 30 : 45 (j) 72 : 90 (k) 28 : 14 (l) $\frac{14}{42}$

(m) $\frac{18}{54}$ (n) $\frac{17}{85}$ (o) $\frac{19}{114}$ (p) $\frac{57}{76}$

5 Write each of the following ratios in its simplest form :

(a) $\frac{1}{2} : \frac{1}{4}$ (b) $\frac{1}{2} : \frac{3}{4}$ (c) $\frac{4}{5} : \frac{2}{5}$ (d) $\frac{2}{3} : \frac{3}{4}$

(e) $\frac{3}{4} \div \frac{5}{6}$ (f) $\frac{5}{8} \div \frac{3}{4}$ (g) $\frac{1}{3} : 2$ (h) $5 : \frac{4}{5}$

(i) $1\frac{1}{2} : 1\frac{1}{4}$ (j) $3\frac{4}{7} : 3\frac{1}{8}$ (k) $3 : 4\frac{3}{4}$ (l) $\frac{3}{8} : 2\frac{1}{4}$

6 Write each of the following ratios in its simplest form :

(a) 1.5 : 3 (b) 6.4 : 16 (c) 1.2 : 3.6

(d) 2.5 : 3.5 (e) 18 : 6.3 (f) 5.5 : 22

(g) 6.3 : 18.9 (h) $1.5 : 1\frac{3}{4}$ (i) $3\frac{1}{8} : 6.25$

(j) $2.4 : 2\frac{2}{5}$ (k) $3.2 : \frac{8}{5}$ (l) $5.25 : 7\frac{7}{8}$

(m) $1\frac{3}{5} : 2.2$ (n) 2.3 : 5.75 (o) $0.84 : 2\frac{3}{9}$

7 Express the ratio between the two numbers by two methods :

(a) 8 , 12 (b) 14 , 128

(c) 2.4 , 18 (d) 185 , 370

8 Compare the two ratios in each of the following :

(a) $\frac{3}{4}$ and $\frac{5}{8}$ (b) $\frac{3}{11}$ and $\frac{2}{9}$

(c) $\frac{3}{8}$ and $\frac{5}{12}$ (d) $\frac{1}{6}$ and $\frac{5}{24}$

9 Complete the following :

(a) The ratio between two numbers = $\frac{\cdots\cdots}{\cdots\cdots}$ (Matrouh 2014)

(b) In the ratio $\frac{a}{b}$, the first term is ……… and the second term is ………

(c) The ratio between any side length of a square and its perimeter is ………

(Qena 2017 , Giza 2016)

(d) The ratio between the perimeter of a rhombus and its side length = ……… : ………

(e) The ratio between any side length of the equilateral triangle and its perimeter = ……… : ……… (Qena 2015)

(f) The ratio between the perimeter of a square and the perimeter of an equilateral triangle , if the side length of each of them is 3 cm.
= ……… : ………

(g) 4 : 6 = $\frac{\cdots\cdots}{3}$

(h) $\frac{0.5}{4}$ = 1 : ……… (El-Dakahlia 2011)

(i) In the opposite figure :



AC : BE = ……… : ……… (Aswan 2013)

10 Choose the correct answer :

(a) Which of the following ratios is equal to the ratio $\frac{8}{18}$?
($\frac{6}{16}$ or $\frac{9}{15}$ or $\frac{24}{36}$ or $\frac{56}{126}$)

(b) The circumference of the circle : the length of its diameter = ………
(2 π : 1 or 1 : 2 π or π : 1 or 1 : π)

(c) The ratio between the perimeter of any equilateral triangle and its side length = ……… (Giza 2015) (1 : 4 or 1 : 3 or 3 : 1 or 4 : 1)

(d) The circumference of the circle : its radius length = ………
(1 : 2 π or π : r or 2 π : 1 or 1 : π)

(e) If the side length of a square is 4 cm. and the dimensions of a rectangle are 2 cm. and 8 cm. , then the ratio between the area of the square and the area of the rectangle is ………
(1 : 4 or 2 : 1 or 1 : 1 or 1 : 2)

(f) The ratio between the perimeter of a square and its side length = ... : .... (1 : 4 or 4 : 1 or 1 : 16 or 16 : 1)

(g) A rectangle whose length is 9 cm. and its area is 54 cm^2 , then the ratio between its length and its width = ... : .... (Ismailia 2011)

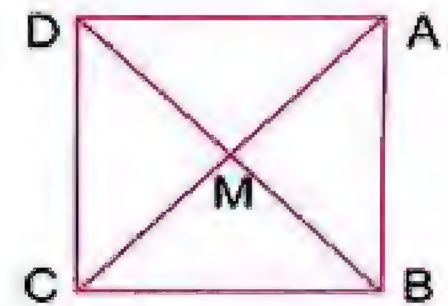
(1 : 6 or 6 : 1 or 3 : 2 or 2 : 1)

(h) If the length of a rectangle is 6 cm. and its area is 24 cm^2 , then the ratio between its perimeter and its length is .... (Cairo 2011)

(4 : 1 or 3 : 2 or 12 : 5 or 10 : 3)

(i) A rectangle is of length 10 cm. and its width is $\frac{3}{5}$ of its length , then the ratio between the width of the rectangle and its perimeter = ... (5 : 16 or 5 : 3 or 3 : 16 or 16 : 3)

(j) In the opposite figure :



If ABCD is a square , then AM : MC = ... : ....

(Giza 2013) (1 : 4 or 1 : 3 or 1 : 2 or 1 : 1)

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11 If Ahmed has L.E. 40 and his sister Hend has L.E. 105

Find the ratio between what Ahmed has and what his sister has.



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12 The total number of boys and girls in a school is 480 , if the number of boys in this school is 320 , find :



(a) The ratio between the number of boys and the number of girls.

(b) The ratio between the number of boys and the total number of pupils.

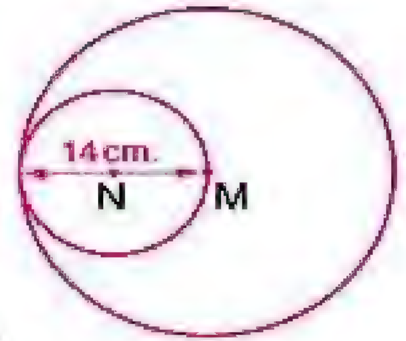
(c) The ratio between the number of girls and the total number of pupils.

1 Lesson

13 An accountant in a bank earns L.E. 4000 as a monthly salary.
He spends $\frac{3}{4}$ of his salary and saves the remainder.
Find the ratio between what the accountant spends to his monthly salary. (Suez 2015)

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14 Using the opposite figure , complete the following :



(a) The radius length of the larger circle is ....

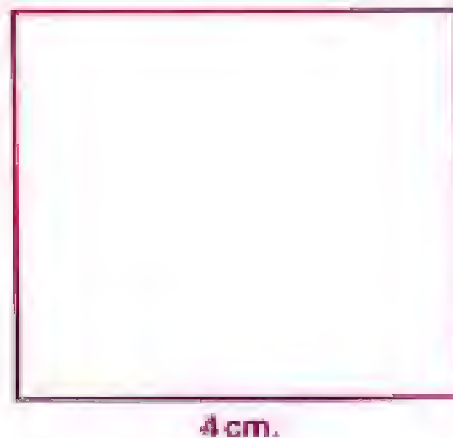
(b) The radius length of the smaller circle is ....

(c) The radius length of the larger circle : the radius length of the smaller circle = ... : ....

(d) The circumference of the larger circle : the circumference of the smaller circle = ... : .... (where $\pi = \frac{22}{7}$)

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15 In the figure below , a square is of side length 4 cm. and a rectangle whose dimensions are 6 cm. and 3 cm. Find :





(a) The ratio between the perimeter of the square and the perimeter of the rectangle.

(b) The ratio between the area of the square and the area of the rectangle.

(c) The ratio between the length of the rectangle and its perimeter.

16 The area of a rectangle is 32 cm^2 and its width = 4 cm. Find :

(a) The length of the rectangle.

(b) The ratio between the width of the rectangle and its length.

(c) The ratio between the length of the rectangle and its perimeter.

17 If the area of a triangle is 24 cm^2 and the length of its base is 8 cm. , find :

(a) The height of the triangle.

(b) The ratio between the base length of the triangle and its height.

18 A rectangle and a square have the same perimeter. If the length of the rectangle is 6 cm. and its length is twice its width , then find :

(a) The ratio between the perimeter and the width of the rectangle.

(b) The ratio between the perimeter and the length of the rectangle.

(c) The ratio between the area of the rectangle and the area of the square.



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19 If the length of a rectangle is twice its width , find :

(a) The ratio between the length of the rectangle and its perimeter.

(b) The ratio between the width of the rectangle and its perimeter.

20 In the opposite figure :

Find the ratio between the area of the green triangle and the area of the red triangle.





Lesson 2

Follow : Properties of ratio

Property (3)

To compare two quantities using ratio, they must have the same unit.

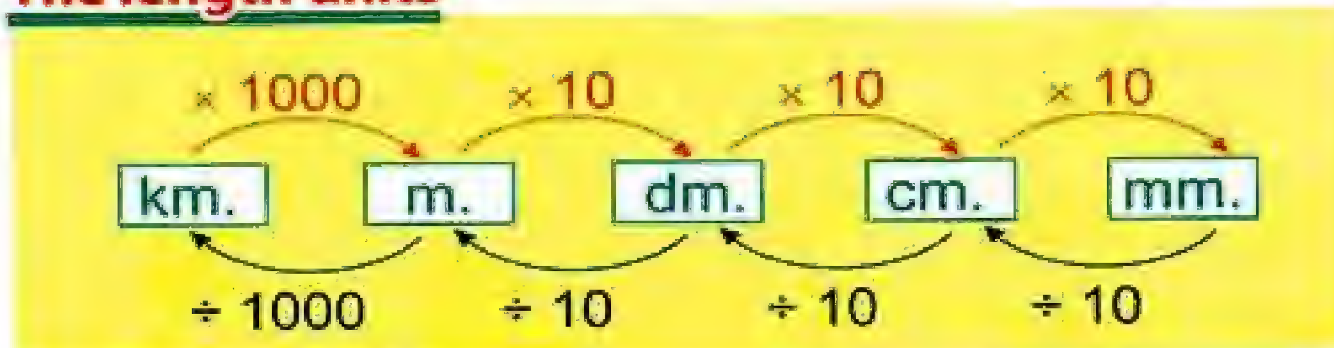
Property (4)

The ratio between two quantities has no units.

- Before studying examples , you have to remember some measuring units and their converting rules.

Measuring units and their converting rules

The length units

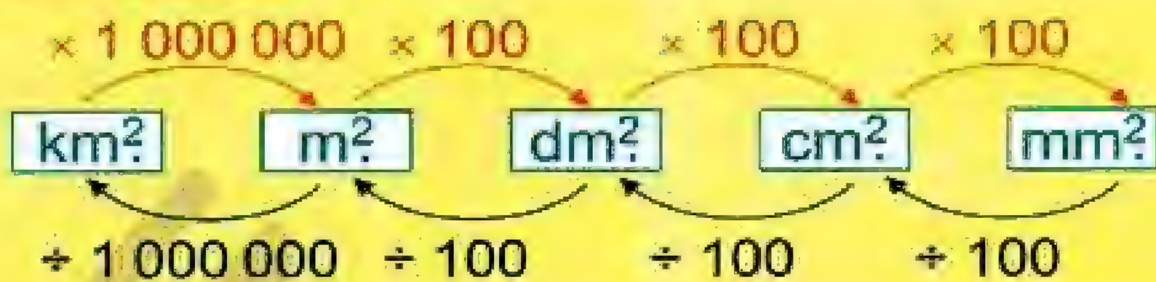




For example :

- 5 km. = 5 × 1000 = 5000 m.
- 6000 cm. = 6000 ÷ 100 = 60 m.

The area units

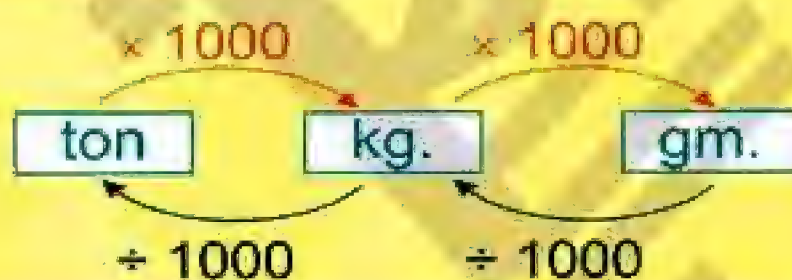




For example :

- $3 \text{ km}^2 = 3 \times 1\,000\,000 = 3\,000\,000 \text{ m}^2$
- $1000 \text{ cm}^2 = 1000 \div 100 = 10 \text{ dm}^2$

The weight units

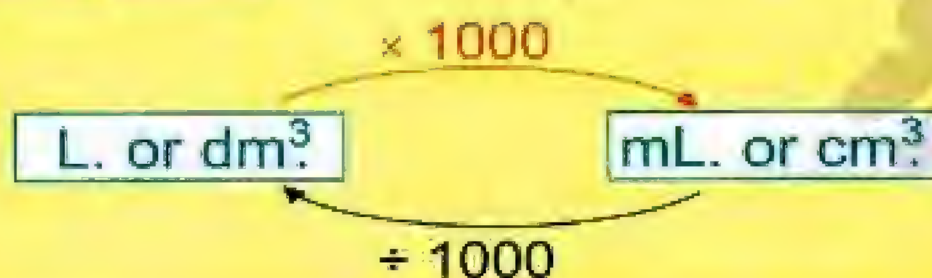




For example :

- 6 kg. = 6 × 1000 = 6000 gm.
- 20 000 kg. = 20 000 ÷ 1000 = 20 tons.

The capacity units

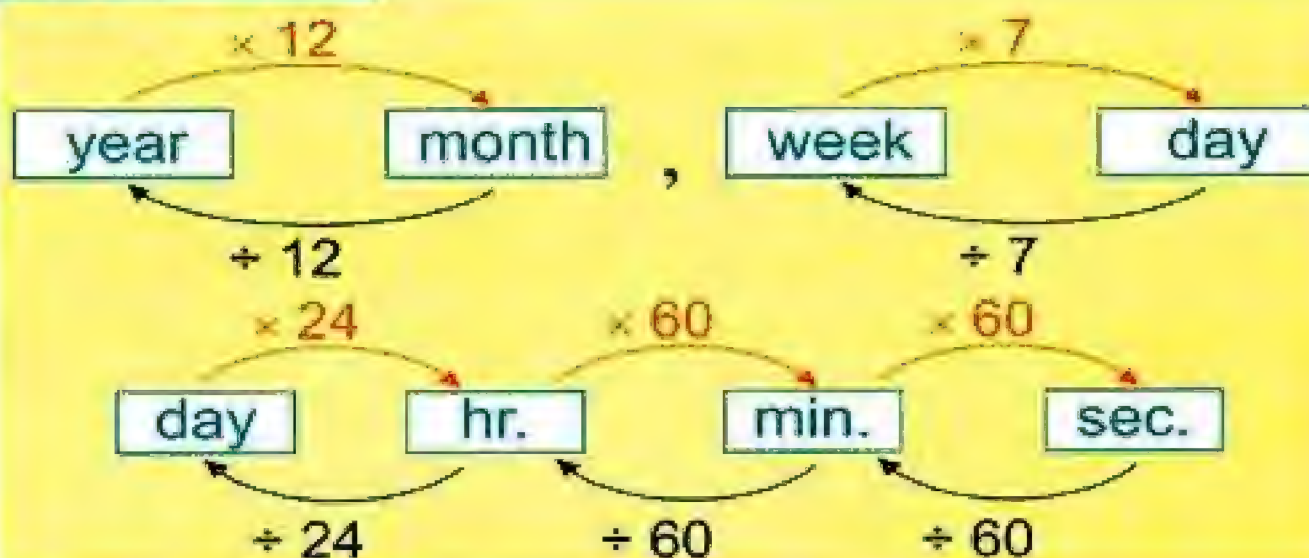




For example :

- $5 \text{ L.} = 5 \times 1000 = 5000 \text{ cm}^3$
- $7000 \text{ cm}^3 = 7000 \div 1000 = 7 \text{ L.}$

The time units





For example :

- 5 hr. = 5 × 60 = 300 min.
- 49 days = 49 ÷ 7 = 7 weeks.

2 Lesson

Units of cultivated lands

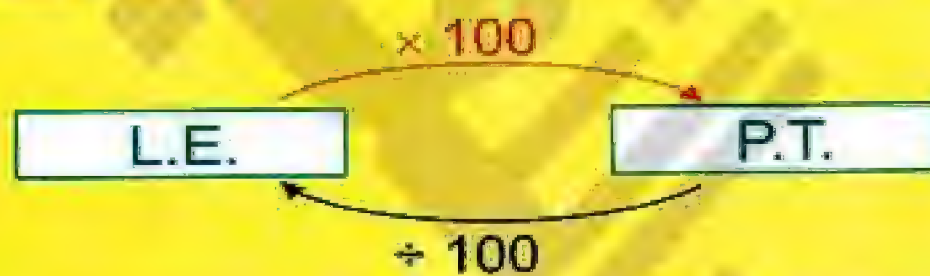


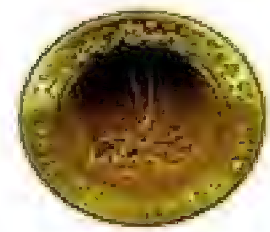


For example :

- 2 feddans = 2 × 24 × 24 = 1152 sahms
- 120 kirats = 120 ÷ 24 = 5 feddans

The money units



For example :

- L.E. 50 = 50 × 100 = P.T. 5000
- P.T. 1000 = 1000 ÷ 100 = L.E. 10

Example 1

Find each of the following ratios in its simplest form :

[a] 50 cm. : 1.5 m.

[b] 350 gm. : $\frac{1}{2}$ kg.

[c] 8 hr. : 2 days

[d] 3 years : 18 months

[e] $1\frac{1}{2}$ hr. : 54 min.

[f] 3 weeks : 24 days

Solution

Before you find each of them in its simplest form, you must change the units to be the same (the preference is converting the greater unit).

[a]	50 cm.	:	1.5 m.	(1.5 m. = 1.5 × 100 = 150 cm.)
	50 cm.	:	150 cm.	
	50	:	150	(÷ 10)
	5	:	15	(÷ 5)
	1	:	3	

[b] 350 gm.	:	$\frac{1}{2}$ kg.	($\frac{1}{2}$ kg. = $\frac{1}{2}$ × 1000 = 500 gm.)
350 gm.	:	500 gm.	
350	:	500	(÷ 10)
35	:	50	(÷ 5)
7	:	10	

[c] 8 hr.	:	2 days	(2 days = 2 × 24 = 48 hr.)
8 hr.	:	48 hr.	
8	:	48	(÷ 8)
1	:	6	

[d] 3 years	:	18 months	(3 years = 3 × 12 = 36 months)
36 months	:	18 months	
36	:	18	(÷ 9)
4	:	2	(÷ 2)
2	:	1	

[e] $1\frac{1}{2}$ hr.	:	54 min.	($1\frac{1}{2}$ hr. = $1\frac{1}{2}$ × 60 = 90 min.)
90 min.	:	54 min.	
90	:	54	(÷ 9)
10	:	6	(÷ 2)
5	:	3	

[f] 3 weeks	:	24 days	(3 weeks = 3 × 7 = 21 days)
21 days	:	24 days	
21	:	24	(÷ 3)
7	:	8	

Try by yourself

Find , in its simplest form , the ratio between :

[a] P.T. 75 : L.E. 2

[b] 500 gm. : 2 kg.

[c] 6 hr. : $2\frac{1}{2}$ days

[d] 3 m. : 30 cm.



2 Lesson

Example 2

Compare each two of the following, then find the ratio between them in its simplest form :

[a] 12 kirats and 1.25 feddan. **[b]** P.T. 630 and L.E. 9

[c] 2500 kg. and 1.75 ton.

Solution

[a] (1.25 feddan = 1.25 × 24 = 30 kirats)

12 kirats < 30 kirats

and 12 kirats : 30 kirats

12 : 30 (÷ 6)

2 : 5

---

[b] (L.E. 9 = 9 × 100 = P.T. 900)

P.T. 630 < P.T 900

and P.T. 630 : P.T. 900

630 : 900 (÷ 10)

63 : 90 (÷ 9)

7 : 10

---

[c] (1.75 ton = 1.75 × 1000 = 1750 kg.)

2500 kg. > 1750 kg.

and 2500 kg. : 1750 kg.

2500 : 1750 (÷ 10)

250 : 175 (÷ 5)

50 : 35 (÷ 5)

10 : 7

Try by yourself

Compare each two of the following , then find the ratio between them in its simplest form :

[a] $\frac{1}{2}$ kg. and 700 gm.

[b] $2\frac{1}{2}$ kirats and 50 sahms.

Remember that :

1 The area of the triangle = $\frac{1}{2}$ × the base length × the height

i.e. $A = \frac{1}{2} \times b \times h$

2 The area of the parallelogram = the base length × the height

i.e. $A = b \times h$

3 The area of the rhombus = the side length × the height

i.e. $A = S \times h$

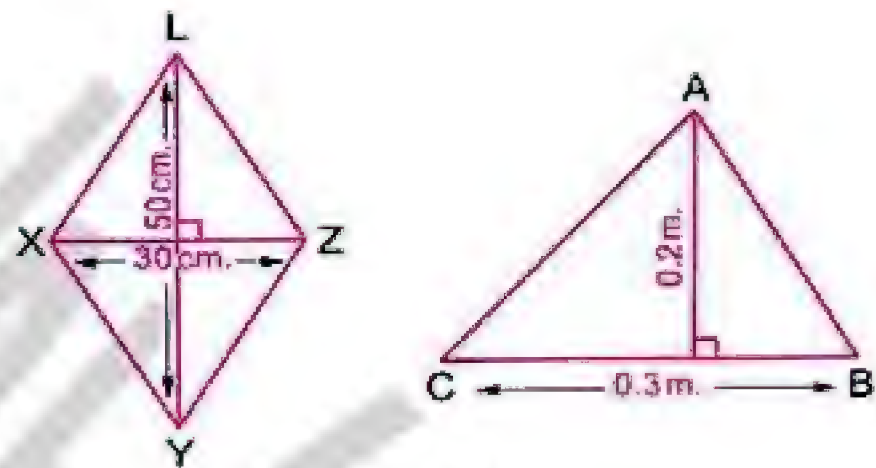
or $A = \frac{1}{2} \times d_1 \times d_2$

Where d_1 and d_2 are the lengths of its two diagonals.

Example 3

In the opposite figures :

Find the ratio between the area of the rhombus XYZL and the area of the triangle ABC



Solution

The area of the rhombus XYZL = $\frac{1}{2} \times d_1 \times d_2 = \frac{1}{2} \times 50 \times 30 = 750$ cm^2

The area of the triangle ABC = $\frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 0.3 \times 0.2$

$= \frac{1}{2} \times 30 \times 20 = 300$ cm^2

Notice that :

0.2 m. = 0.2 × 100 = 20 cm.

0.3 m. = 0.3 × 100 = 30 cm.

The area of the rhombus XYZL	:	the area of the triangle ABC	
750 cm^2	:	300 cm^2	
750	:	300	(÷ 10)
75	:	30	(÷ 5)
15	:	6	(÷ 3)
5	:	2	

Exercise 2 Follow : Properties of ratio


Solve Exercise

From the school book

1 Find in the simplest form the ratio between each of the following :

(a) 3000 gm. : 5 kg.

(b) P.T. 25 : L.E. 2

(c) 18 hours : one day.

(d) 1.75 metres : 150 cm.

(e) 📖 $2\frac{1}{2}$ an hour : 75 minutes.

(f) 📖 12 kirats : 1.25 feddan.

(g) P.T. 225 : L.E. $4\frac{1}{2}$

(h) 📖 0.75 kirat : 16 sahms.

(i) 7.5 dm. : 30 cm.

(j) 0.6 km. : 250 m.

(k) 📖 8 hours : $3\frac{1}{3}$ days. (Port Said 2013)

(l) 30 months : 3 years.

(m) 📖 $5\frac{1}{4}$ pounds : 125 piastres.

(n) 📖 $2\frac{1}{4}$ m. : 125 cm.

(o) 📖 2.25 feddans : 16 kirats.

(p) 150 mL. : $\frac{1}{4}$ L.

2 Complete by writing each ratio in its simplest form :

(a) 400 cm. : 2 m. = ...

(b) $\frac{1}{2}$ an hour : 36 minutes = ... : ....

(c) 250 gm. : $\frac{1}{2}$ kg. = ... : .... (El-Menia 2014)

(d) 18 kirats : $\frac{1}{2}$ feddans = ... : .... (El-Fayoum 2017)

(e) $\frac{1}{2}$ m^2. : 75 dm^2. = ... : ....

(f) 32 months : 4 years = ... : .... (El-Sharkia 2011)

(g) 2250 cm^2. : $\frac{1}{4}$ m^2. = ... : ....

(h) $3\frac{1}{2}$ L. : 2500 mL. = ... : ....

(i) The ratio between 250 piastres and $7\frac{1}{2}$ pounds equals .... (Cairo 2012)

(j) The ratio between 12 kirats to $1\frac{1}{2}$ feddans equals .... : .... (El-Sharkia 2017)

3 **Choose the correct answer :**

(a) 800 gm. : 1.6 kg. = ……… (1 : 2 or 2 : 1 or 5 : 1 or 1 : 20)

(b) 3 m. : 20 dm. = ……… (3 : 2 or 3 : 200 or 3 : 20 or 30 : 2)

(c) 125 piastres : 5 pounds = ……… (El-Beheira 2011)
(1 : 4 or 4 : 1 or 1 : 5 or 5 : 1)

(d) 2 km. : 800 m. = ……… (1 : 4 or 5 : 2 or 1 : 2 or 4 : 1)

(e) 75 cm. : $2\frac{1}{4}$ m. = ……… (Alexandria 2011)
($\frac{1}{3}$ cm. or $\frac{1}{3}$ metre or $\frac{1}{3}$ or 3)

(f) The ratio between 25 seconds and $\frac{1}{3}$ minute = ……… : ………
(El-Dakahlia 2011) (5 : 4 or 4 : 5 or 3 : 5 or 5 : 3)

(g) 24 hours : 2 days = ……… (4 : 1 or 12 : 1 or 1 : 48 or 1 : 2)

(h) The ratio between 27 months and 3 years is ……… (Qena 2016)
(9 : 1 or 9 : 10 or 3 : 4 or 27 : 30)

(i) 5 weeks : 25 days = ……… (1 : 5 or 5 : 7 or 7 : 5 or 5 : 1)

(j) 150 grams : a quarter of kilogram = ……… (El-Sharkia 2013)
(5 : 3 or 1 : 2 or 3 : 5 or 3 : 2)

---

4 **Compare each two of the following , then find the ratio between them in its simplest form :**

(a) 250 gm. and $\frac{1}{2}$ kg.

(b) 2 kirats and 18 sahms.

(c) 1.8 m. and 30 cm.

(d) $2\frac{1}{3}$ days and 7 hours.

---

5 Karim is 1.2 m. high and his father is 180 cm. high.
Find the ratio between the height of Karim and the height of his father.



6 Two lorries , the load of the first is 600 kg. and the load of the second is $1\frac{1}{2}$ ton.
Find the ratio between the load of the first and the load of the second.



7 Ahmed has L.E. 15 He spent 725 piastres.
Find :

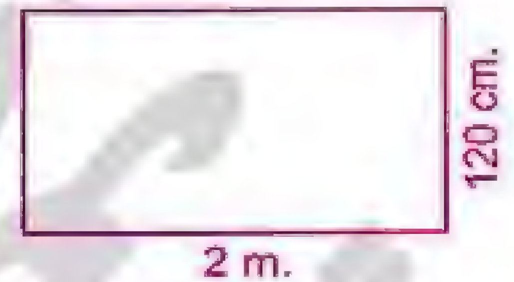


(a) The ratio between the money he spent and the total amount he had.

(b) The ratio between the money left with him and the total amount he had.

(c) The ratio between the money left with him and the money he spent.

8 The opposite figure represents a rectangle of length 2 m. and of width 120 cm.
Calculate :

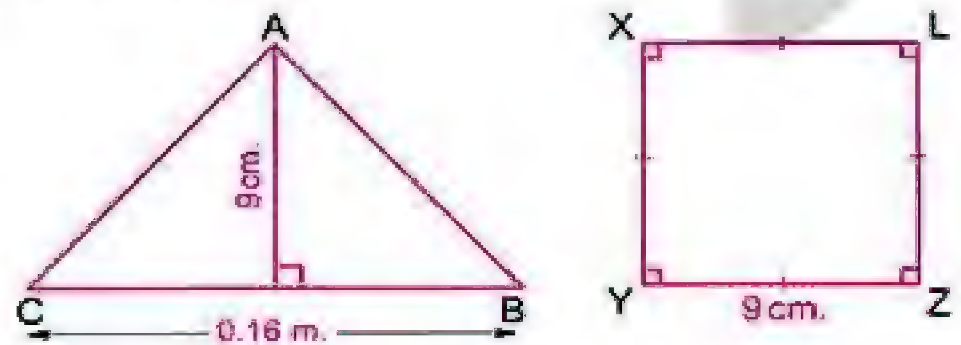


(a) The ratio between the width of the rectangle and its length.

(b) The ratio between the length of the rectangle and its perimeter.

(El-Sharkia 2015)

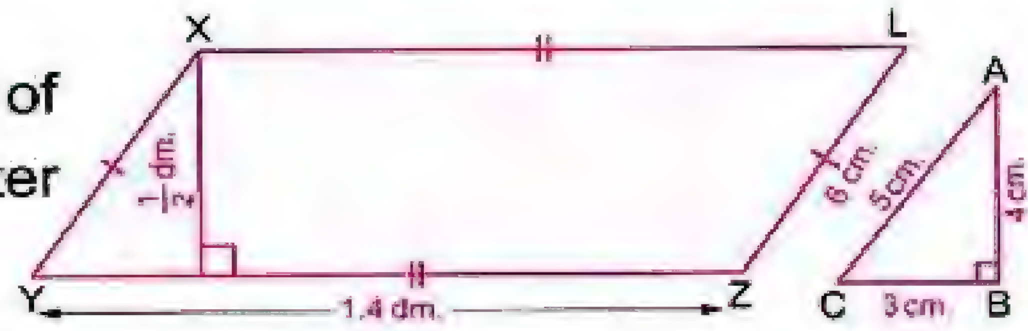
9 Using the opposite figure , find the ratio between the area of the triangle ABC and the area of the square XYZL



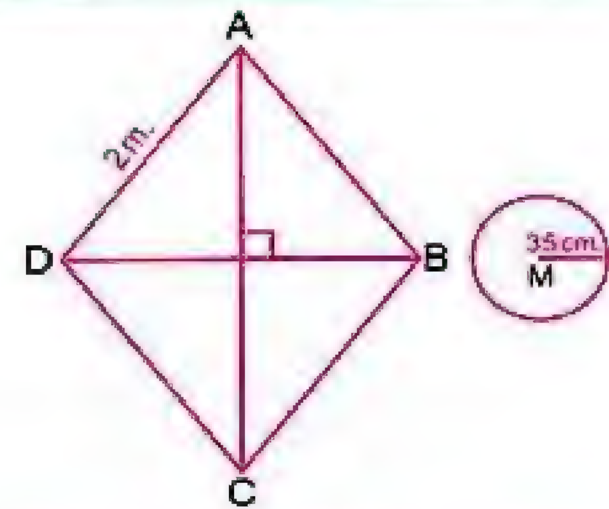
10 Using the opposite figure , find :

(a) The ratio between the perimeter of the triangle ABC and the perimeter of the parallelogram XYZL

(b) The ratio between the area of the parallelogram XYZL and the area of the triangle ABC



11 Using the opposite figure , find the ratio between the perimeter of the rhombus ABCD and the circumference of the circle M



12 Find in the simplest form the ratio between the circumference of the circle whose radius length is 105 mm. and the perimeter of the square whose side length is 7.5 cm.

13 Find in the simplest form the ratio between the circumference of the circle whose diameter length is 2.8 dm. and the perimeter of the rectangle whose length is 7 cm. and width is 5 cm.

14 Find in the simplest form the ratio between the perimeter of the triangle whose side lengths are 6 cm. , 8 cm. and 10 cm. and the perimeter of the rhombus whose side length is 0.15 m.

15 Find the ratio between the perimeters of a rectangle of length 3.2 m. and width 280 cm., and an equilateral triangle of side length 2.5 m.

16 A square of diagonal length 8 cm. and a parallelogram of base length 10 cm. and its corresponding height is 6 cm.
Find the ratio between the area of the square and the area of the parallelogram.

17 A parallelogram is of base length 62 mm. and its corresponding height is 38 mm. , and a rhombus whose diagonal lengths are 6.2 cm. and 3.8 cm. Find the ratio between the area of the parallelogram and the area of the rhombus.

---

18 The perimeter of a rectangle is 6.4 m. and its width is 120 cm. Find :

(a) The length of the rectangle.

(b) The ratio between its length and its width.

(c) The ratio between its length and its perimeter.

(d) The ratio between its width and its perimeter.



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19 A square is of perimeter 2.4 m. and a rectangle is of a length exceeds 10 cm. than the side length of the square, if the width of the rectangle is 24 cm., find the ratio between the area of the square and the area of the rectangle.



Lesson 3

Miscellaneous exercises on ratio and its properties

In this lesson, we will show and solve some applications on the ratio by knowing one of each :

1. The ratio between two quantities and the value of one of them.
2. The ratio between two quantities and the sum or difference between these quantities.



Example 1

The ratio between the number of girls and the number of boys in a school is 3 : 4 If the number of boys is 280 Find the number of girls.

Solution

(By using the concept of "the value of the part")

Since , $\frac{\text{the number of girls}}{\text{the number of boys}} = \frac{3}{4}$

Then , girls = 3 parts and boys = 4 parts.

Since , the number of boys is 280

Then , 4 parts is equivalent to 280

Then , the value of one part = 280 ÷ 4 = 70

Then , the number of girls = 70 × 3 = 210 girls.



Another solution

Since , $\frac{\text{the number of girls}}{\text{the number of boys}} = \frac{3}{4}$

Then , the number of girls = $\frac{3}{4}$ × the number of boys.

$= \frac{3}{4} \times 280 = 210$ girls. (280 ÷ 4 = 70, cancelled to $\frac{3}{1} \times 70$)

Third solution

(By using cross multiplication)

Girls	:	Boys
3	:	4
?	:	280

The number of girls = $\frac{3 \times 280}{4}$ = 210 girls.

Example 2

The number of pupils in a primary school is 720 pupils, if the ratio between the number of boys and the number of girls is 5 : 4

Find the number of boys and the number of girls.



Solution

(By using the concept of "the sum of parts")

Since , $\frac{\text{the number of boys}}{\text{the number of girls}} = \frac{5}{4}$

Then , boys = 5 parts and girls = 4 parts.

Then , the sum of parts = 5 + 4 = 9 parts.

i.e. 9 parts are equivalent to 720

Then , the value of one part = 720 ÷ 9 = 80 pupils.

Then , the number of boys = 80 × 5 = 400 boys.

, the number of girls = 80 × 4 = 320 girls.

Another solution

(By using cross multiplication)

Boys	:	Girls	:	Sum
5	:	4	:	9
?	:	?	:	720

The number of boys = $\frac{5 \times 720}{9}$ = 400 boys.

The number of girls = $\frac{4 \times 720}{9}$ = 320 girls.

Example 3



The ratio between Karim's weight and Eman's weight is 3 : 5

If the difference between their weights is 20 kg.

Find the weight of each of them.

Solution

Since , $\frac{\text{Karim's weight}}{\text{Eman's weight}} = \frac{3}{5}$

Then , Karim's weight = 3 parts and Eman's weight = 5 parts.

Then , the difference between parts = 5 – 3 = 2 parts.

i.e. 2 parts are equivalent to 20 kg.

Then , the value of one part = 20 ÷ 2 = 10 kg.

Then , Karim's weight = 10 × 3 = 30 kg.

Eman's weight = 10 × 5 = 50 kg.

Another solution

Karim	:	Eman	:	Difference
3	:	5	:	2
?	:	?	:	20

Karim's weight = $\frac{3 \times 20}{2}$ = 30 kg.

Eman's weight = $\frac{5 \times 20}{2}$ = 50 kg.



3 Lesson

Notice that :



Try by yourself

The ratio between Mina's age and Ahmed's age is 7 : 11 and the difference between their ages is 8 years.
Find the age of each of them.

Example 4

The perimeter of a rectangle is 320 cm. and the ratio between its length and width is 3 : 2 Find each of its length and width.

Solution

Since , The perimeter of the rectangle = 320 cm.
Then , Half of the perimeter = length + width = 320 ÷ 2 = 160 cm.
Since , Length : width = 3 : 2
Then , Length = 3 parts and width = 2 parts.
Then , The sum of parts = 3 + 2 = 5 parts.
i.e. 5 parts are equivalent to 160 cm.
Then , The value of one part = 160 ÷ 5 = 32 cm.
Then , The length = 32 × 3 = 96 cm. and the width = 32 × 2 = 64 cm.

Another solution

Half of the perimeter = 320 ÷ 2 = 160 cm.
Length + Width = 160 cm.

Length	:	Width	:	Sum
3	:	2	:	5
?	:	?	:	160

The length = $\frac{3 \times 160}{5}$ = 96 cm. The width = $\frac{2 \times 160}{5}$ = 64 cm.

Exercise 3 Miscellaneous exercises on ratio and its properties


Solve Exercise

From the school book



1 The ratio between the number of girls and the number of boys in a school is 3 : 8
If the number of girls is 312
Find the number of boys.



2 If the ratio between the age of a child and the age of his father = 2 : 13
If the child's age is 6 years.
Find the father's age. (Matrouh 2014)



3 If the ratio between what Seif saved to what his sister Jehan saved was 9 : 11 , if what Seif saved was 189 pounds.
Find what Jehan saved. (El-Beheira 2015)



4 The ratio between the lengths of two pieces of cloth is 9 : 10 and the length of the first piece is 86.4 m.
Find the length of the second.



5 A wire was divided into 2 parts in the ratio 5 : 9, if the length of the shortest part equals 45 cm.
Find the total length of the wire.

3
Lesson



6 The ratio between the height of a building and the height of the Cairo Tower is $\frac{4}{15}$
If the height of the building is 48 metres.
Find the height of the Cairo Tower.



7 The number of pupils in the sixth grade in a school is 260 and the ratio between the number of boys to the number of girls is 6 : 7
Find the number of boys and the number of girls in this grade. **(El-Kalyoubia 2013)**



8 In a school, there are 560 students, if the number of girls = $\frac{3}{5}$ the number of boys.
Find the number of boys and the number of girls in this school. **(Giza 2017)**

9 The ratio between two numbers is 7 : 12
Find the two numbers if their sum is 76



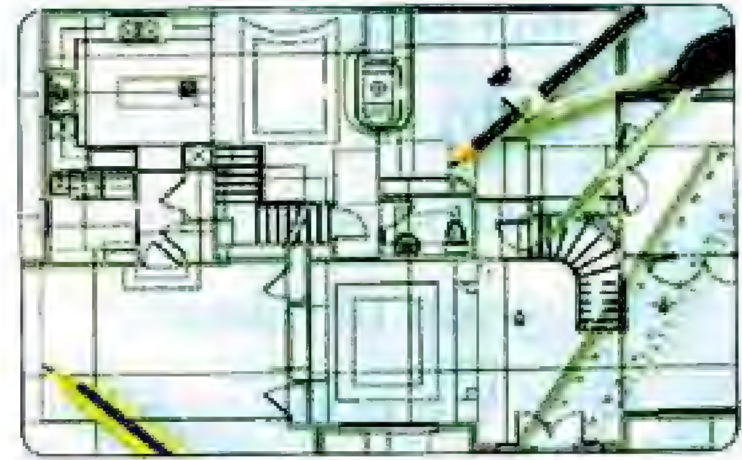
10 The ratio between the lengths of two roads is 2 : 5 and the difference between their lengths is 21 km. Find the length of each road.

(Matrouh 2017)



11 Amgad and Karim saved an amount of money. If the amount saved by Karim exceeds the amount saved by Amgad by L.E. 5 and the ratio between the savings of Amgad and Karim is 7 : 9
Find the savings of each.

12 If we divide a piece of land between two brothers in the ratio 7 : 4 and if the share of the first is more than the share of the second by 60 square metres.
Find the total area of the piece of the land.



(Damietta 2011)

---

13 If the ratio between the areas of two pieces of land is 5 : 9 , if the area of one piece exceeds the other by 132 m^2
Find the area of the other piece of land.

---

14 In a school , there are 300 pupils in the sixth grade who have a maths exam. If the ratio of the pupils who succeeded to the pupils who failed is 5 : 1
Find the number of each.



---

15 In the national football league , if the ratio between the number of goals of El-Ahly football team and the number of goals of El-Zamalek football team is 4 : 5 and their sum is 72 goals.
Find the number of goals of each team.



---

16 If the ratio between the side lengths of two squares is 3 : 5 and their sum is 64 cm. Find the side length of each.

---

17 Two persons started a food business.
The ratio between what the first paid and what the second paid was 3 : 5 , and the second paid L.E. 17500 more than the first.
Find the capital of the business.



3 Lesson

18 A fruit seller sells one kilogram of apples for L.E. 10 , if the ratio between the price of one kilogram of apples and the price of one kilogram of bananas is 5 : 2
Find the price of 5 kilograms of bananas.



19 If the ratio between the measures of two acute angles in a right-angled triangle is 7 : 11 Find the measure of each of them. **(Port Said 2016)**

20 A rectangular shaped piece of land, the ratio between its length and its width is 9 : 7 , if the difference between the length and the width of it is 18 m.
Calculate each of the length , the width and the perimeter of the land.
(El-Beheira 2014)

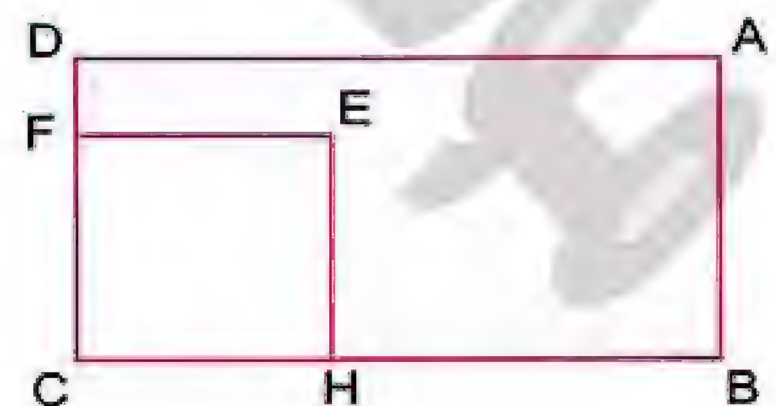
21 The ratio between the length and the width of a rectangle is 12 : 5 , if its length is 36 cm. Find the width of the rectangle and the ratio between the width and the perimeter of the rectangle.

22 The ratio between the length and the width of a rectangle is 9 : 5
If the perimeter of the rectangle is 56 metres , find out the length and the width of the rectangle , then calculate its area.

23 A rectangular piece of land of perimeter 660 m. , if the ratio between its width and its length is 5 : 6 Find :
(a) Its length and its width.
(b) Its area.

24 **In the opposite figure :**

ABCD is a rectangle in which AB = 8 cm.
, CHEF is a square of side length 6 cm.
If $\frac{CH}{HB} = \frac{2}{3}$, find :
(a) The length of $\overline{AD}$
(b) The perimeter of the shaded part.



(c) The ratio between the area of the square and the area of the rectangle.

(d) The area of the shaded part.

" Use more than one way "

25 **Choose the correct answer :**

(a) If the ratio of the clever pupils in a primary school to the total number of the pupils is 1 : 6 , what is the number of the clever pupils if the total number of the pupils is 750 pupils ?

(25 *or* 225 *or* 125 *or* 250)

(b) If the sum of two numbers is 105 and the ratio between them is 2 : 3 , then the greater one is .... (El-Dakahlia 2011)

(21 *or* 42 *or* 63 *or* 84)

(c) If the ratio between the number of girls and the number of boys in a school is 3 : 5 and the number of girls is 300 , then the total number of the pupils in this school is .... (500 *or* 800 *or* 900 *or* 1500)

(d) If a : b = 5 : 3 and a – b = 8 , then b = ...

(6 *or* 8 *or* 10 *or* 12)

(e) The ratio between the ages of two pupils is 3 : 4 and the difference between their ages is 3 years , then the age of the older is .... years.

(3 *or* 9 *or* 4 *or* 12)

(f) In a primary school, if the ratio between the number of boys and the number of pupils of the school is 3 : 7, then the ratio between the number of boys and the number of girls is .... (Damietta 2016)

(4 : 3 *or* 3 : 4 *or* 3 : 7 *or* 2 : 5)

(g) If the ratio between the perimeter of a rectangle and its length equals 8 : 3 and its perimeter equals 64 cm., then its width equals ....

(3 cm. *or* 8 cm. *or* 12 cm. *or* 24 cm.)



3 Lesson

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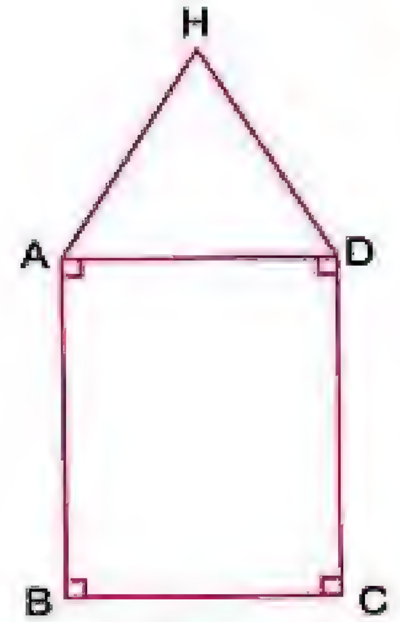
26 In the opposite figure :

HAD is an equilateral triangle and its perimeter is 18 cm.

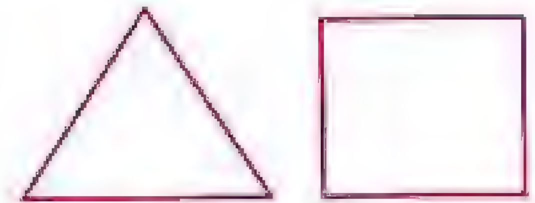
If AD : AB = 2 : 3

Calculate the area of the rectangle ABCD

(El-Dakahlia 2013)



27 A piece of wire of length 40 cm., it is divided into two parts in the ratio 2 : 3, the small part is shaped as a square and the great part is shaped as an equilateral triangle, find the side length of each of the square and the triangle. (Assiut 2016)



28 If $\frac{19}{16}$ of the sum of two numbers is 95 and the ratio between the two numbers is 7 : 9 Find each of the two numbers.



Lesson 4

Ratio among three numbers

If Ahmed's height is 180 cm., Sarah's height is 160 cm. and Karim's height is 120 cm., then you can find the ratio among their heights as follows :



Ahmed's height	:	Sarah's height	:	Karim's height	
180	:	160	:	120	(÷ 10)
18	:	16	:	12	(÷ 2)
9	:	8	:	6	

Thus, the ratio among their heights is 9 : 8 : 6

Example 1

Write each of the following ratios in its simplest form :

[a] 36 : 48 : 84

[b] 1.25 : 5 : 1.5

[c] $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$

[d] $3\frac{1}{3} : 6\frac{1}{4} : 4\frac{3}{8}$

Solution

[a]

36	:	48	:	84	(÷ 4)
9	:	12	:	21	(÷ 3)
3	:	4	:	7	

4 Lesson

[b] 1.25 : 5 : 1.5 (× 100)
125 : 500 : 150 (÷ 5)
25 : 100 : 30 (÷ 5)
5 : 20 : 6

[c] $\frac{1}{2}$: $\frac{1}{3}$: $\frac{1}{4}$ (× 12 where the L.C.M. of 2 , 3 and 4 is 12)

$\frac{1}{2} \times 12$: $\frac{1}{3} \times 12$: $\frac{1}{4} \times 12$

6 : 4 : 3

[d] $3\frac{1}{3}$: $6\frac{1}{4}$: $4\frac{3}{8}$ (Change mixed numbers into improper fractions)

$\frac{10}{3}$: $\frac{25}{4}$: $\frac{35}{8}$ (× 24)

$\frac{10}{3} \times 24$: $\frac{25}{4} \times 24$: $\frac{35}{8} \times 24$

80 : 150 : 105 (÷ 5)
16 : 30 : 21

Example 2

Write each of the following ratios in its simplest form :

[a] $2\frac{1}{2}$ kg. : 3000 gm. : 4.5 kg.
[b] L.E. 12 : L.E. 8 : P.T. 6400
[c] 3.2 m. : 80 cm. : 24 dm.
[d] $\frac{1}{8}$ day : 6 hours : $1\frac{1}{2}$ day

Solution

[a] $2\frac{1}{2}$ kg. : 3000 gm. : 4.5 kg.
2500 gm. : 3000 gm. : 4500 gm.
2500 : 3000 : 4500 (÷ 100)
25 : 30 : 45 (÷ 5)
5 : 6 : 9

Notice that :
$2\frac{1}{2}$ kg. = 2500 gm.
4.5 kg. = 4500 gm.

[b] L.E. 12 : L.E. 8 : P.T. 6400
P.T. 1200 : P.T. 800 : P.T. 6400
1200 : 800 : 6400 (÷ 100)
12 : 8 : 64 (÷ 4)
3 : 2 : 16

Notice that :
L.E. 12 = P.T. 1200
L.E. 8 = P.T. 800

[c] 3.2 m. : 80 cm. : 24 dm.
320 cm. : 80 cm. : 240 cm.
320 : 80 : 240 (÷ 10)
32 : 8 : 24 (÷ 8)
4 : 1 : 3

Notice that :
3.2 m. = 320 cm.
24 dm. = 240 cm.

[d] $\frac{1}{8}$ day : 6 hours : $1\frac{1}{2}$ day
3 hours : 6 hours : 36 hours
3 : 6 : 36 (÷ 3)
1 : 2 : 12

Notice that :
$\frac{1}{8}$ day = 3 hours.
$1\frac{1}{2}$ day = 36 hours.

Example 3

The ratio of the money that Karim has to Mina to Ahmed is 12 : 15 : 25
If Ahmed has L.E. 600, find the money that each of Karim and Mina has.



Solution

The value of one part = 600 ÷ 25 = L.E. 24
What Karim has = 12 × 24 = L.E. 288
What Mina has = 15 × 24 = L.E. 360

Another solution

Karim	:	Mina	:	Ahmed
12	:	15	:	25
?	:	?	:	600

What Karim has = $\frac{12 \times 600}{25}$ = L.E. 288

What Mina has = $\frac{15 \times 600}{25}$ = L.E. 360

4 Lesson

Example 4

The sum of 3 numbers is 56, and the ratio among them is 2 : 1 : 5
Find each of these numbers.

Solution

The sum of the parts = 2 + 1 + 5 = 8 parts.

The value of one part = 56 ÷ 8 = 7

The first number = 7 × 2 = 14

The second number = 7 × 1 = 7

The third number = 7 × 5 = 35

Another solution

1^{st} number	:	2^{nd} number	:	3^{rd} number	:	Sum
2	:	1	:	5	:	8
?	:	?	:	?	:	56

The 1^{st} number $= \frac{2 \times 56}{8} = 14$

The 2^{nd} number $= \frac{1 \times 56}{8} = 7$

The 3^{rd} number $= \frac{5 \times 56}{8} = 35$

Example 5

The ratio among the measures of the angles of a triangle is 2 : 3 : 4
Find the measure of each angle of this triangle.

Solution

1^{st} angle	:	2^{nd} angle	:	3^{rd} angle	:	Sum
2	:	3	:	4	:	9
?	:	?	:	?	:	180°

Remember that :
The sum of the measures of the interior angles of any triangle = 180°

The measure of the 1^{st} angle $= \frac{2 \times 180°}{9} = 40°$

The measure of the 2^{nd} angle $= \frac{3 \times 180°}{9} = 60°$

The measure of the 3^{rd} angle $= \frac{4 \times 180°}{9} = 80°$

Try by yourself

The perimeter of a triangle is 108 cm. Find the lengths of its sides if the ratio among the side lengths is 4 : 3 : 5

Example 6

The ratio of the weights of three persons is 8 : 5 : 6 ، if the difference between the weights of the first one and the third one is 24 kg.
Find the weight of each one.



Solution

1^{st} person	:	2^{nd} person	:	3^{rd} person	:	Difference
8	:	5	:	6	:	2
?	:	?	:	?	:	24

The first person's weight $= \frac{8 \times 24}{2} = 96$ kg.

The second person's weight $= \frac{5 \times 24}{2} = 60$ kg.

The third person's weight $= \frac{6 \times 24}{2} = 72$ kg.

4 Lesson

Combining ratios

Example 7

A , B and C are three numbers. If A : B = 3 : 5 and B : C = 4 : 7
Find A : B : C

Solution

(By using the L.C.M.)

* Write the two ratios as follows :

	A	:	B	:	C
1st ratio	3	:	5		
2nd ratio			4	:	7

- We notice that the parts of B have different values in the two given ratios.
- Therefore , we must change these different values to take one value which is the L.C.M. of the two values of B

Since , the L.C.M. of 5 and 4 is 20
Then , B must be equivalent to 20
So, we multiply both terms of the first ratio by 4 and multiply both terms of the second ratio by 5

A	:	B	:	C	
3	:	5	:		(× 4)
	:	4	:	7	(× 5)
12	:	20	:		
	:	20	:	35	
12	:	20	:	35	

Another solution

A	:	B	:	C
3	:	5	:	
	:	4	:	7
12	:	20	:	35

Example 8

Write the ratio among a , b and c in each of the following if :

[a] a : b = $\frac{7}{8}$ and b : c = 5 : 6

[b] a = $\frac{2}{3}$ b and b : c = 6 : 8

[c] a : c = 4 : 5 and b : c = 3 : 8

Solution

[a] a : b = $\frac{7}{8}$ means a : b = 7 : 8 and b : c = 5 : 6

a	:	b	:	c
7	:	8	:	
	:	5	:	6
35	:	40	:	48

[b] a = $\frac{2}{3}$ b means a : b = 2 : 3 and b : c = 6 : 8

a	:	b	:	c	
2	:	3	:		
	:	6	:	8	
12	:	18	:	24	(÷ 6)
2	:	3	:	4	

[c]

a	:	b	:	c
4	:		:	5
	:	3	:	8
32	:	15	:	40

Try by yourself

If a : b = 5 : 3 and b : c = 2 : 5

Find a : b : c



Exercise 4 Ratio among three numbers


Solve Exercise

From the school book

1 Write each of the following ratios in its simplest form :

(a) 12 : 18 : 36
(b) 45 : 30 : 75
(c) 21 : 63 : 35
(d) 56 : 32 : 40
(e) 5.4 : 7.2 : 4.8
(f) 2.4 : 1.8 : 3
(g) $\frac{1}{2} : \frac{2}{3} : \frac{1}{4}$
(h) $\frac{1}{4} : \frac{2}{5} : \frac{3}{10}$
(i) $\frac{2}{3} : \frac{3}{4} : \frac{1}{2}$
(j) $\frac{1}{2} : \frac{1}{3} : \frac{1}{5}$
(k) $1\frac{1}{2} : 1\frac{1}{8} : \frac{3}{4}$
(l) $7\frac{1}{2} : 2\frac{1}{4} : 4\frac{1}{2}$
(m) $\frac{1}{2} : 2 : 2\frac{1}{4}$
(n) $\frac{3}{4} : 1.5 : \frac{1}{2}$

2 Find the ratio of each of the following quantities in its simplest form :

(a) 7 kg. : $2\frac{1}{2}$ kg. : 4500 gm.
(b) 2.8 km. : 9800 m. : 15.4 km.
(c) 2.1 m. : 140 cm. : 0.49 m.
(d) L.E. 8 : L.E. 12 : P.T. 3200
(e) $1\frac{1}{4}$ feddan : 18 kirats : 288 sahms
(f) 25 dm. : 500 cm. : 7.5 m.

3 Complete :

(a) If A : B = 2 : 3 and B : C = 3 : 5 , then A : C = ... : .... (El-Gharbia 2015)
(b) If a : b = 2 : 3 and b : c = 6 : 7 , then a : c = ... : .... (Kafr El-Sheikh 2013)
(c) If a : b = 4 : 3 and b : c = 2 : 3 , then a : c = ... : .... (Cairo 2011)
(d) If A : B = 3 : 4 and B : C = 8 : 5 , then A : B : C = ... : .... : .... (Qena 2012)
(e) If $\frac{a}{b} = \frac{4}{7}$, $\frac{b}{c} = \frac{7}{9}$, then a : b : c = ... : .... : .... (El-Kalyoubia 2017)
(f) If a : b = 5 : 6 and b : c = 8 : 9 , then a : c = ... : ....
(g) $\frac{1}{2} : \frac{3}{4} : \frac{2}{3}$ = 6 : .... : .... (Souhag 2012)
(h) If (A is half B) , (B is twice C) , then A : C = ... : .... (El-Dakahlia 2017)

4 **Choose the correct answer between brackets :**

(a) $\frac{1}{2} : \frac{1}{7} : \frac{1}{14} =$ .... (7 : 2 : 1 or 1 : 2 : 7 or 7 : 1 : 2)

(b) If A : B = 2 : 3 and A : C = 2 : 5 , then B : C = ... (Giza 2012)

(1 : 4 or 5 : 3 or 3 : 5 or 4 : 5)

(c) If a : b = 2 : 3 and c : b = 5 : 2 , then a : c = ... (El-Fayoum 2012)

(2 : 5 or 4 : 15 or 15 : 4 or 5 : 3)

(d) If a : b = 3 : 2 and c : b = 3 : 4 , then a : c = ... (El-Dakahlia 2013)

(2 : 1 or 1 : 2 or 4 : 1 or 1 : 4)

(e) If the ratio among the measures of the angles of a triangle is 1 : 2 : 3 , then the measure of the smallest angle equals ....

(10° or 30° or 45° or 60°) (El-Beheira 2017)

(f) If the height of Sahar : the height of Noha = 2 : 3 , and the height of Noha : the height of Ola = 6 : 7 , then the height of Sahar : the height of Ola = ... (El-Monofia 2014)

(2 : 7 or 3 : 7 or 4 : 7 or 7 : 9)

---

5 If the ratio among the heights of three buildings is 3 : 4 : 5 and the height of the first building is 12 metres.
Calculate the heights of the second and the third building. (Assiut 2012)



---

6 If the ratio among the prices of three electrical sets (TV - oven - fridge) is 4 : 5 : 8 and the price of the TV set is L.E. 1200
Calculate the price of each of the oven and the fridge. (Cairo 2014)



4
Lesson

7 The ratio among the loads of three lorries is 11 : 9 : 13 , if the load of the second lorry is 108 kg. Find the load of each of the first and the third lorry.



8 The ratio among three numbers is 3 : 5 : 7 and their sum is 45
Find the value of each number.

9 The number of pupils of a primary school in the first, the second and the third grades is 240 pupils, if the ratio among the three grades is 5 : 4 : 3 Calculate the number of pupils in each grade of them. **(Cairo 2017)**



10 The ratio of the production of three factories for TV sets is 3 : 2 : 1, if the sum of production of the first and the second factories is 25000 sets. Find the production of each factory.



11 If the ratio among the ages of Hoda, Mona and Ola is 2 : 4 : 5 and the difference between the age of Hoda and that of Mona is 8 years. Calculate the age of each of Hoda, Mona and Ola. **(South Sinai 2014)**



12 The ratio of what Hoda has to what Ahmed has to what Samah has is 6 : 5 : 2
Find how much money each of them has if Hoda has L.E. 200 more than Samah.





13 The ratio among the production of three factories is 9 : 7 : 11 and the production of the third factory exceeds the production of the first one by 1000 tons.
Find the production of each factory.



14 In a school , the ratio of the number of pupils in the fourth grade to the number of pupils in the fifth grade to the number of pupils in the sixth grade is 10 : 13 : 8 , if the difference between the number of pupils in the fifth and sixth grades is 45 pupils , find the number of pupils in each grade.

15 ABC is a triangle , where AB : BC : AC = 7 : 5 : 4 and AC = 64 cm.
Find AB , BC and the perimeter of the triangle.

16 The ratio among the lengths of the sides of a triangle is 2 : 3 : 4
If the perimeter of the triangle is 54 cm.
Find the length of each side of the triangle. (Damietta 2016)

17 If the ratio among the measures of the angles of a triangle is 5 : 6 : 7 and the measure of the first angle is 50°
Find the measure of each of the other two angles. (Aswan 2017 , Beni Suef 2015)

18 The ratio among the measures of the angles of a triangle is 3 : 7 : 8
Find the greatest measure of the angles measures of this triangle.

19 The ratio among the measurements of the angles of a triangle is 1 : 2 : 3
Find the measure of each angle and mention the type of this triangle according to the measures of its angles. (El-Sharkia 2016)

4
Lesson

20 ABC is a right-angled triangle at B , if the ratio among the lengths of its sides AB : BC : CA is 3 : 4 : 5 and AB = 12 cm. , then find the lengths of the sides of the triangle and calculate its perimeter and its area.

21 A triangular piece of land , the ratio among the lengths of its sides is 4 : 6 : 7 , if the perimeter of this piece of land equals 51 metres. Find the lengths of the sides of the land. **(Cairo 2011)**

22 ABC is a triangle in which AB : BC : CA = 3 : 5 : 7, if the difference between the lengths of $\overline{AB}$ and $\overline{BC}$ is 4 cm. Find the lengths of the sides of the triangle and its perimeter.

23 If weight of Noura : weight of Manar = 1 : 3 and weight of Manar : weight of Nahla = 2 : 5 Find the ratio among the weights of Noura , Manar and Nahla.



24 If the ratio between the height of Khalid to the height of Ahmed is 2 : 3 and the ratio between the height of Ahmed to the height of Hani is 4 : 5 Calculate the ratio between the height of Khalid to that of Hani. **(El-Gharbia 2013)**



25 If Kamal has $\frac{3}{4}$ of Ramzy's money and Hany has $\frac{2}{5}$ of Ramzy's money. Find the ratio of Kamal's money : Ramzy's money : Hany's money.



26 A fruit seller has three kinds of fruit (banana - grapes - guava). If the ratio between the weight of bananas to the weight of grapes is 2 : 3 and the ratio between the weight of grapes to the weight of guava is 2 : 4



Find the ratio among the weights of banana , grapes and guava.

27 **Find the ratio shown in each of the following :**

(a) If $a = \frac{2}{3}$ b and $b = \frac{4}{7}$ c , find a : b : c

(b) If a : b = 3 : 4 and a : c = 4 : 5 , find b : c

(c) If $\frac{a}{b} = \frac{9}{8}$ and $\frac{a}{c} = \frac{6}{5}$, find b : c

(d) If $a = \frac{7}{9}$ b and c = a + b , find a : b : c

(e) If $a = \frac{5}{8}$ c and b = c – a , find a : b : c



For Excellent Pupils

28 If the ratio among the share of Mina , the share of Bassem and the share of Esslam is 3 : 4 : 5 and the twice of the share of Mina exceeds the share of Bassem by L.E. 18

Find the share of each of Mina , Bassem and Esslam.



Lesson 5

Ratio applications (Rates)

Definition

A rate is a ratio of two quantities with different measurement units.

For example :



If a car travels 300 km. in 5 hours, the rate is $\frac{300 \text{ km.}}{5 \text{ hours}}$ (km. and hour are different measurement units).

- The rate per 1 hour is $\frac{300 \text{ km.}}{5 \text{ hours}} = \frac{60 \text{ km.}}{1 \text{ hour}}$ (you can write 60 km. per hour).
- The unit for this rate is $\frac{\text{km}}{\text{hour}}$ or km. / hour

Notice that :

- A ratio has no unit (because it is a comparison of two quantities that have the same unit).
- A rate has always a unit (because it is a comparison of two quantities that have different measurement units).
- A unit rate is the unit of the first quantity per each unit of the second quantity.

Example 1

A typist types a sheet containing 630 words within 7 minutes.
Find the rate of the typing.



Solution

The rate of the typing = $\frac{630 \text{ words}}{7 \text{ minutes}}$ = 90 words/min.

Example 2

A car covers 280 km. in 4 hours.
Find the speed of the car.
(Knowing that : speed = $\frac{\text{distance}}{\text{time}}$)



Solution

The speed of the car (rate) = $\frac{280 \text{ km.}}{4 \text{ hr.}}$ = 70 km./hr.

Try by yourself

A worker paints a wall of area 96 m^2 in 8 hours.
Calculate the rate of performance of the worker.

Example 3

An agricultural tractor ploughs six feddans in three hours.
Find the rate of performance of the tractor.
If another tractor ploughs six kirats in ten minutes , which of the two tractors has better performance ?



Solution

- The rate of the 1st tractor = $\frac{144 \text{ kirats}}{180 \text{ minutes}}$
  = 0.8 kirat/min.

Notice that :

6 fed. = 6 × 24 = 144 kirats
3 hr. = 3 × 60 = 180 min.

- The rate of the 2nd tractor = $\frac{6 \text{ kirats}}{10 \text{ minutes}}$

  = 0.6 kirat/min.

So , the first tractor has better performance than the second (because 0.8 > 0.6).

Example 4



Which is the better deal for the same kind of pens :
Two pens for 5.5 pounds or 3 pens for 6.9 pounds ?

Solution

- $\frac{5.5 \text{ pounds}}{2 \text{ pens}} = \frac{2.75 \text{ pounds}}{1 \text{ pen}}$ = 2.75 pounds per pen.
- $\frac{6.9 \text{ pounds}}{3 \text{ pens}} = \frac{2.3 \text{ pounds}}{1 \text{ pen}}$ = 2.3 pounds per pen.

So , three pens for 6.9 pounds is the better deal (because 2.3 < 2.75).

Try by yourself

A car covers 300 km. in 4 hours and another car covers 65 km. in 50 min. Which of the two cars is faster ?

Exercise 5 Ratio applications (Rates)



From the school book

1 Complete the following :

(a) A rate is .... (El-Dakahlia 2011)

(b) A family spends L.E. 480 in 6 days, the rate of what this family spends per day = ... L.E. per day. (El-Sharkia 2011)

(c) A worker paints a wall of area 100 m^2 in 8 hours , then the rate of work = ... m^2/hr.

(d) A machine irrigates 15 feddans in 10 hours , then its rate = ... feddans/hour (Luxor 2015)

(e) A factory produces 4000 cans of juice during 8 hours, then the rate of the production = ... (Cairo 2013)

(f) A machine produces 81 metres of cloth in 3 hours, then the production rate of this machine is .... per hour. (Alexandria 2011)

(g) A machine produces 600 metres of clothes regularly in one hour and half , then the production rate of this machine is .... per hour.

(h) A carpenter needs 25 m^2 of wood to make 10 tables , then the rate of used wood = ... m^2/table

(i) A water tap is leaking 360 litres of water in one hour , then the leaking rate of water per minute = ... litres/minute (El-Kalyoubia 2017)

2 Choose the correct answer :

(a) If a car covered 180 kilometres in 3 hours , then the speed of this car = ... kilometres/hour. (Beni Suef 2011)
(60 *or* 80 *or* 90 *or* 540)

(b) Hassan spends L.E. 75 within three days , then the rate of what Hassan spends = ... L.E./day (25 *or* 30 *or* 45 *or* 135)

(c) An oven uses 20 litres of fuel every 5 hours , then the rate of the used fuel = ... litres/hour (100 *or* 4 *or* 25 *or* $\frac{1}{4}$)

(d) An agricultural machine ploughs 14 feddans in 3.5 hours , then the rate of performance of the machine is ········· feddan / hour.

(Cairo 2017) ($\frac{1}{4}$ or $2\frac{1}{2}$ or 4 or $10\frac{1}{2}$)

(e) If Amira drinks 14 glasses of milk weekly , then the rate of what she drinks daily is ········· glasses. (Damietta 2016) (3 or 7 or 2 or $\frac{1}{2}$)

3 A car covers 240 km. in three hours.
Calculate the speed of the car.

(El-Kalyoubia 2016)



4 A car consumes 35 litres of gas to cover 140 km.
Calculate the rate of consumption.



5 A car consumes 20 litres of benzine to cover a distance of 250 km.
Calculate the rate of consumption of benzine.



6 Hassan spends L.E. 45 within three days.
What's the rate of what Hassan spends per day ? (Port Said 2014)

7 A computer coloured printer prints 12 papers every 4 minutes.
Find the rate of printing of this printer.

(Beni Suef 2014)



8 A factory produces 5000 juice cans in 8 hours.
Find the production rate.
(El-Kalyoubia 2012)



9 A factory produces 7200 bottles of soft drink in 8 hours.
What is the rate of production ?
(Suez 2011)



10 A water tap is leaking 20 litres of water in 5 hours.
Find the leaking rate of water per hour.
Please advise them. (El-Kalyoubia 2015)



11 A ship for transporting goods among countries consumes 25 litres of fuel to cover a distance of 15 km.
Calculate the rate of consumption of fuel.



12 A worker uses 3 gallons of painting to paint a wall of area 6 m^2.
Find the rate of used gallons of painting per metre square.



13 A car consumes 15 litres of benzine to cover a distance of 375 km. , another car consumes 17 litres of the same benzine to cover a distance of 340 km.
Which car consumes lower benzine ?

(Qena 2013)



14 Which is better buy :
8 rulers for 22 pounds or 12 rulers for 30 pounds ?
(where all rulers are of the same kind)



15 Two machines for the manufacture of cloth , the first produces 500 metres of cloth in two hours and the second produces 600 metres of cloth in 2 hours and half. Which of the two machines is more efficient ? (Alexandria 2016)



16 A factory (A) produces 600 lamps in 40 hours, another factory (B) produces 700 lamps from the same kind in 50 hours.
Which factory has a better rate of production ?



17 A plough for agricultural land , ploughs 6 feddans within 3 hours. If another plough ploughs 10 feddans within 4 hours.
Which of them has a better rate ?

(Qena 2017 , El-Sharkia 2014)



18 A runner covers 9 metres in 10 seconds and another one covers 21 metres in 0.5 minute. Who is faster ?



For Excellent Pupils

19 A tap filled an aquarium in 6 hours and another tap filled the aquarium in 3 hours and a third tap filled the aquarium in 2 hours, if the three taps work together How many minutes are needed to fill the aquarium ?





Test on Unit One

Answer the following questions :

1 Choose the correct answer from the given ones :

(a) In any equilateral triangle , the ratio between its side length and its perimeter equals ………… (3 : 1 or 3 : 2 or 1 : 3 or 2 : 3)

(b) The ratio between 12 kirats to $1\frac{1}{2}$ feddan equals ………… (12 : 1.5 or 4 : 1 or 1 : 3 or 3 : 1)

(c) If the ratio among the measurements of angles of a triangle is 1 : 2 : 3 , then the measure of the smallest angle equals ………… (10° or 30° or 45° or 60°)

(d) An irrigation machine irrigates 15 feddan in 10 hours , then the rate of work for this machine is ………… feddan/hour. ($\frac{2}{3}$ or $\frac{3}{2}$ or $\frac{5}{2}$ or $\frac{5}{3}$)

(e) $3\frac{4}{7} : 3\frac{1}{8}$ = ………… (7 : 8 or 8 : 7 or 1 : 4 or 1 : 1)

2 Complete :

(a) The ratio between 18 and 6.3 = ………… : ………… (in its simplest form)

(b) 300 gm. : $1\frac{1}{2}$ kg. = ………… : ………… (in its simplest form)

(c) If A : B = 5 : 6 and B : C = 3 : 4 , then A : C = ………… : …………

(d) If the ratio 7 : 13 is the same ratio x : 52 , then x = …………

(e) The ratio between the radius length of the circle and its circumference equals …………

3 **(a)** The ratio between the heights of two buildings in a town is 7 : 4 , if the difference between their heights is 9 metres , find the height of each of them.

(b) If the area of a rectangle is 75 cm^2 and its width is 5 cm. , find :

(1) The length of the rectangle.

(2) The ratio between the length of the rectangle and its perimeter.

---

4 **(a)** A triangular piece of land , the ratio among the lengths of its sides is 3 : 7 : 5 , if the perimeter of this piece of land equals 90 metres. Find the lengths of the sides of the land.

(b) An agricultural tractor ploughs eight feddans in four hours. If another tractor ploughs 18 kirats in 20 minutes , which of the two tractors has better performance ?

---

5 **(a)** The ratio between the length and the width of a rectangle is 7 : 4 If the perimeter of the rectangle is 550 metres , find out the length and the width of the rectangle , then calculate its area.

(b) If Samy's weight : Tamer's weight : Sherif 's weight is 8 : 7 : 9 and Sherif 's weight exceeds Tamer's weight by 12.4 kg.

Find the weight of each one of them.

UNIT TWO

Proportion

Lessons of the unit :

1. Meaning of proportion.
2. Properties of proportion.
3. Drawing scale.
4. Proportional division.
5. Percentage.
6. Applications on the percentage.

⊙ Unit test.



Lesson 1 Meaning of proportion

Prelude



A box contains 6 pencils.
The following table shows the number of pencils in 2 , 3 , 4 , 5 , ... , 10 boxes.

Number of boxes	2	3	4	5	...	10
Number of pencils	12	18	24	30	...	60

From the previous table, we notice that :

[1] The number of pencils in each case is resulted from multiplying the number of corresponding boxes by 6

[2] The number of boxes in each case is resulted from dividing the number of corresponding pencils by 6

- We can write the ratio between the number of pencils and its corresponding number of boxes as follows :

$\frac{12}{2} = 6$, $\frac{18}{3} = 6$, $\frac{24}{4} = 6$, $\frac{30}{5} = 6$, ... , $\frac{60}{10} = 6$

i.e. $\frac{12}{2} = \frac{18}{3} = \frac{24}{4} = \frac{30}{5} = \cdots = \frac{60}{10} = 6$ (constant) and this is called proportion.



1 Lesson

- We can write the ratio between the number of boxes and its corresponding number of pencils as follows :

$\frac{2}{12} = \frac{1}{6}$, $\frac{3}{18} = \frac{1}{6}$, $\frac{4}{24} = \frac{1}{6}$, $\frac{5}{30} = \frac{1}{6}$, ... , $\frac{10}{60} = \frac{1}{6}$

i.e. $\frac{2}{12} = \frac{3}{18} = \frac{4}{24} = \frac{5}{30} = \cdots = \frac{10}{60} = \frac{1}{6}$ (constant) and this is called proportion.

From the previous , we can define the proportion as follows :

Definition :

Proportion is an equality of two or more ratios.

Example 1

Complete the following table to make the numbers of the first row proportional to their corresponding numbers in the second row :

$\div 2$ (first row → second row), $\times 2$ (second row → first row)

2	....	8	....	15	....
1	2	....	9	....	27

Solution

$\div 2$ (first row → second row), $\times 2$ (second row → first row)

2	4	8	18	15	54
1	2	4	9	7.5	27

Example 2

Complete the following table to make the numbers of the first row proportional to their corresponding numbers in the second row :

$\times$ ..... (first row → second row), $\div$ ..... (second row → first row)

2	5	$4\frac{1}{2}$	....	1.2	....
6	....	....	45	....	10

, then complete : $\frac{2}{6} = \frac{5}{\cdots\cdots} = \frac{\cdots\cdots}{\cdots\cdots} = \frac{\cdots\cdots}{\cdots\cdots} = \frac{\cdots\cdots}{\cdots\cdots} = \frac{\cdots\cdots}{\cdots\cdots}$

Solution

× 3	2	5	$4\frac{1}{2}$	15	1.2	$3\frac{1}{3}$
÷ 3	6	15	$13\frac{1}{2}$	45	3.6	10

- $\frac{2}{6} = \frac{5}{15} = \frac{4\frac{1}{2}}{13\frac{1}{2}} = \frac{15}{45} = \frac{1.2}{3.6} = \frac{3\frac{1}{3}}{10}$

Try by yourself

Complete the following table to make the numbers of the first row proportional to their corresponding numbers in the second row :

×	1	9	....	7	2	....
÷	5	....	30	....	....	20

Exercise 6 Meaning of proportion



From the school book

1 Complete each of the following tables to make the corresponding numbers in the two rows proportional :

(a) × 3 , ÷ 3

3	....	....	10	....	41
....	12	27	....	900	....

(b) × ..... , ÷ .....

2	5	....	8	....
12	....	36	....	60

(c) $\times \frac{2}{3}$, $\div \frac{2}{3}$

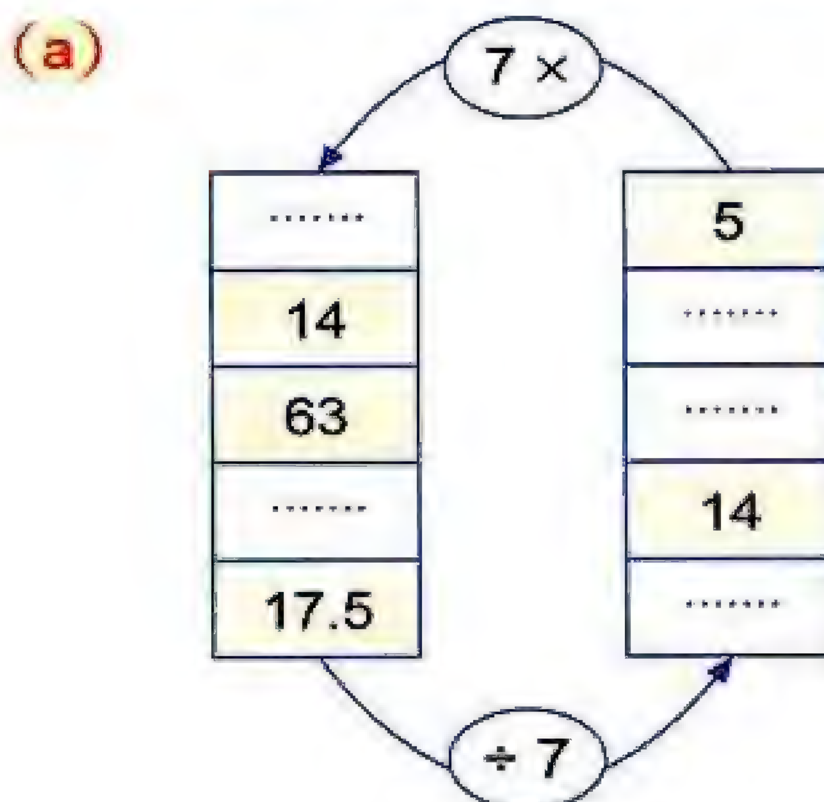
3	9	....	15	....	24	....
2	....	8	....	12	....	18

(d) × ..... , ÷ .....

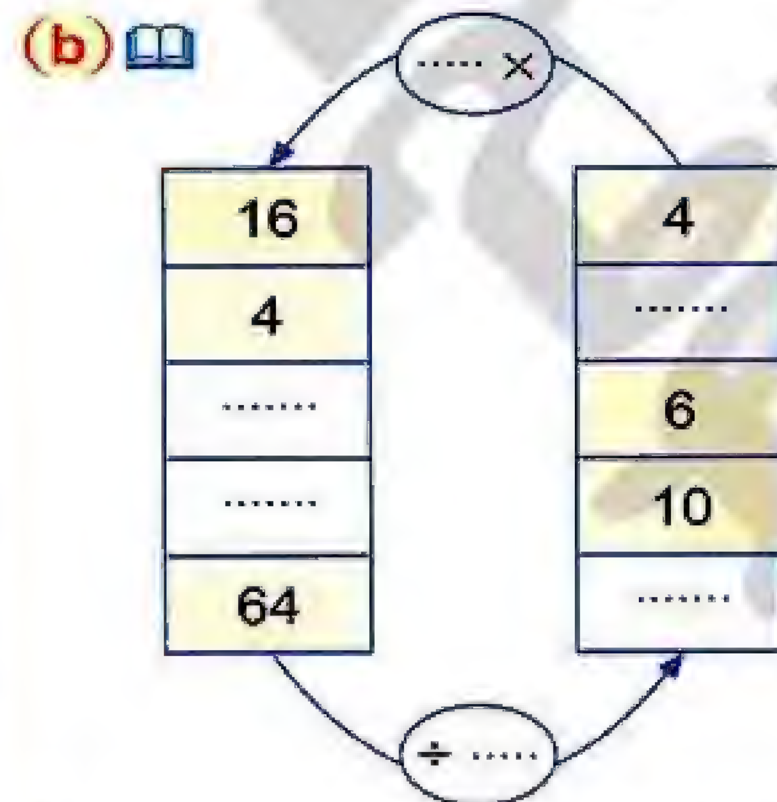
5	....	30	....	75	....	150
6	12	....	72	....	162	....

2 Complete the following diagrams to make the corresponding numbers in the two columns in each diagram proportional , then complete the proportion form which is below each diagram :

(a)



(b)



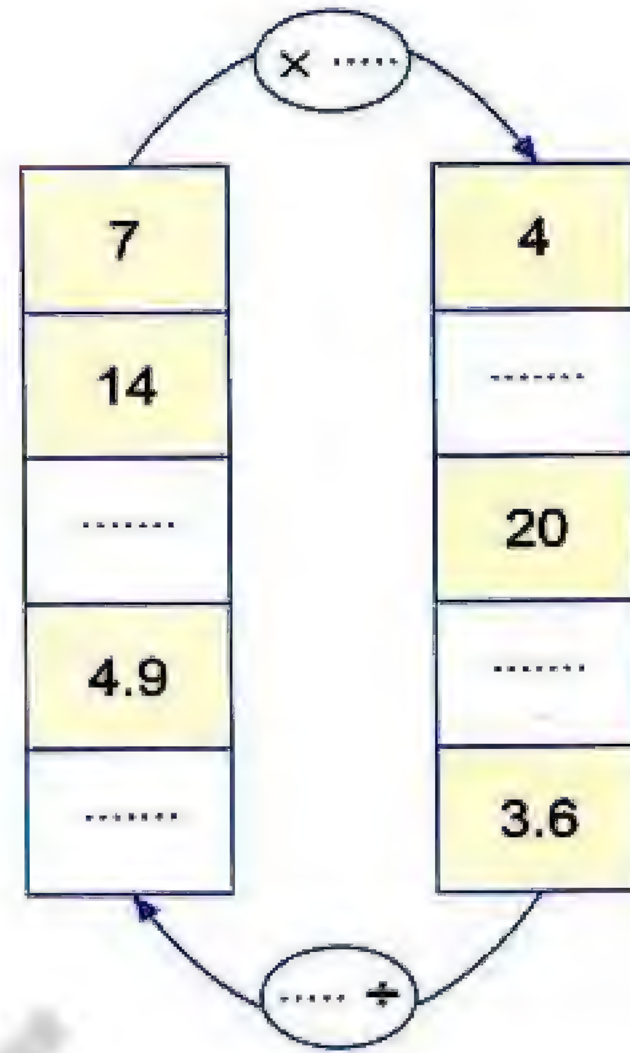
$\frac{4}{16}$ = $\frac{.........}{.........}$ = $\frac{.........}{.........}$ = $\frac{.........}{.........}$ = $\frac{.........}{.........}$

(c)



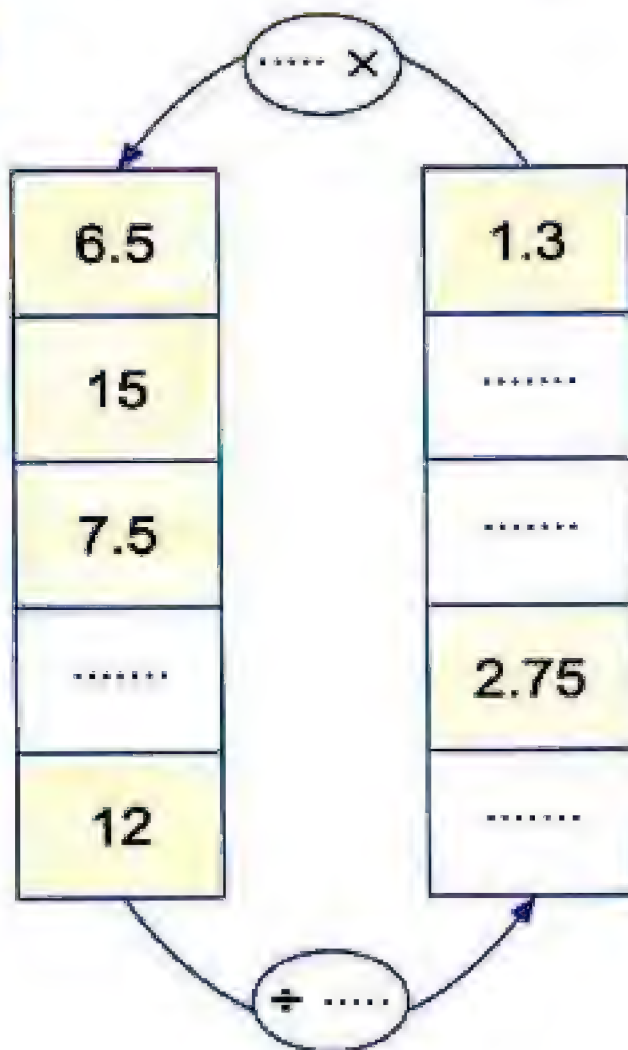
$\frac{6}{15}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$

(d)



$\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$

(e)



$\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$

(f)



$\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$ = $\frac{........}{........}$

1 Lesson

3 If the price of one kg. of apples is L.E. 8 , complete the following table , then write some of forms of proportion :



×	The weight of apples in kg.	1	2	4	....	....	8
	The price in pounds	8	....	....	40	48	....

÷ ......

Some forms of proportion are : $\frac{.........}{.........} = \frac{.........}{.........} = \frac{.........}{.........} = \frac{.........}{.........}$

4 Complete the following table which shows the relation between the time in hours and the distance in kilometres which a car covered in that time :

×	Time	5	....	9	15	....	....	6
	Distance	400	160	....	....	800	760	....

÷ ......

5 Complete the following table which shows the relation between the side length of a square and its perimeter :

×	The side length in cm.	4	$1\frac{1}{2}$	2.4	....	....	$1\frac{3}{8}$
	The perimeter in cm.	....	....	....	5	5.8	....

÷ ......

6 Complete the following table which shows the relation between the side length of an equilateral triangle and its perimeter :

×	The side length in cm.	....	8	....	2.04	....	$\frac{5}{3}$
	The perimeter in cm.	15	....	36	....	1	....

÷ ......



Lesson 2

Properties of proportion

Property (1)

If we multiply (or divide) each of the two terms of a ratio by the same non-zero number , then the resultant ratio is equal to the first ratio and they together form a proportion.

For example :

[1] If we multiply each of the two terms of the ratio $\frac{2}{5}$ by 3, we get the ratio $\frac{6}{15}$

[2] If we divide each of the two terms of the ratio $\frac{6}{15}$ by 3, we get the ratio $\frac{2}{5}$

From **[1]** and **[2]** , we deduce the following proportion $\frac{2}{5} = \frac{6}{15}$

- We say that the numbers 2 , 5 , 6 and 15 are proportional where 2 is called the first term , 5 is called the second term , 6 is called the third term and 15 is called the fourth term and also 2 and 15 are called the extremes of the proportion , 5 and 6 are called the means of the proportion.

2 Lesson

Notice that :

[1] If $\frac{a}{b} = \frac{c}{d}$, then the numbers a , b , c and d are proportional and vice versa.

If a , b , c and d are proportional , then $\frac{a}{b} = \frac{c}{d}$

[2] If $\frac{a}{b} = \frac{c}{d}$, then a : b = c : d (Means: b and c; Extremes: a and d)

For example :

[1] If $\frac{1}{4} = \frac{5}{20}$, then the numbers 1 , 4 , 5 and 20 are proportional.

[2] If 3 , 7 , 9 and 21 are proportional , then $\frac{3}{7} = \frac{9}{21}$

[3] If $\frac{2}{5} = \frac{6}{15}$, then 2 : 5 = 6 : 15 (Means: 5 and 6; Extremes: 2 and 15)

Property (2)

The product of extremes = the product of means

i.e. If $\frac{a}{b} = \frac{c}{d}$, then a × d = b × c

* This rule is called "The cross multiplication" or "Scissors".

For example : If $\frac{2}{3} = \frac{4}{6}$, then 2 × 6 = 3 × 4

Example 1

Find the missing term in the following proportion : $\frac{4}{12} = \frac{20}{....}$

Solution

Assume that the missing term in the proportion is x , you can find the value of x by using one of the following ways :

[1] Corresponding numbers by rows :

* Look for the number which if it is multiplied by 4 , the result will be 12
* You will find that the number = $\frac{12}{4}$ = 3
* Then x = 20 × 3 = 60

4	20
12	x

(× 3)

[2] Corresponding numbers by columns :

* Look for the number which if it is multiplied by 4 , the result will be 20
* You will find that the number = $\frac{20}{4}$ = 5
* Then, x = 12 × 5 = 60

(× 5)

4	20
12	x

[3] The following property of proportion (the product of extremes = the product of means) :

$4 \times x = 12 \times 20$ (divide both sides by 4)

Then, $x = \frac{12 \times 20}{4} = 60$

4	20
12	x

Try by yourself

Find the missing number in each of the following proportions :

[a] $\frac{4}{7} = \frac{\dots}{35}$ **[b]** $\frac{\dots}{32} = \frac{9}{36}$

Example 2

Find the missing term in each of the following for the numbers to be proportional :

[a] 3 , ... , 9 , 24 **[b]** 7.5 , 3.5 , ... , 2.8

[c] $2\frac{1}{4}$, $\frac{1}{2}$, $6\frac{3}{4}$, ...

Solution

Let the missing term be x

[a] Since 3 , x , 9 and 24 are proportional

, then $\frac{3}{x} = \frac{9}{24}$ therefore $x = \frac{3 \times 24}{9} = 8$

[b] Since 7.5 , 3.5 , x and 2.8 are proportional

, then $\frac{7.5}{3.5} = \frac{x}{2.8}$ therefore $x = \frac{2.8 \times 7.5}{3.5} = 6$

[c] Since $2\frac{1}{4}$, $\frac{1}{2}$, $6\frac{3}{4}$ and x are proportional

, then $\frac{2\frac{1}{4}}{\frac{1}{2}} = \frac{6\frac{3}{4}}{x}$ therefore $x = \frac{\frac{1}{2} \times 6\frac{3}{4}}{2\frac{1}{4}} = 1\frac{1}{2}$

Try by yourself

Find the value of x in each of the following proportional sets :

[a] 6 , 12 , 25 and x

[b] x , 16 , 28 and 32

Example 3

A car consumes 18 litres of petrol to cover 240 km. Find :

[a] The number of litres of petrol that the car needs to cover 180 km.

[b] The distance that the car covers to consume 15 litres.

Solution

Petrol in litres	18	x	15
Distance in km.	240	180	y

From the table of proportion :

$x = \frac{18 \times 180}{240} = 13.5$ litres , $y = \frac{240 \times 15}{18} = 200$ km.

Another solution

Petrol in litres : Distance in km.

18 : 240

x : 180

15 : y

$x = \frac{18 \times 180}{240} = 13.5$ litres , $y = \frac{240 \times 15}{18} = 200$ km.

Try by yourself

The price of 4 feddans is L.E. 5000 , if you have L.E. 20000 , then how many feddans can you buy ?

Example 4

The height of a tree is 10.5 m. and the length of its shadow is 7.5 m. Find the height of a house whose shadow length is 11.5 m. at the same time.



Solution

Let the height of the house be x

Since , $\frac{\text{height of the tree}}{\text{shadow of the tree}} = \frac{\text{height of the house}}{\text{shadow of the house}}$ So , $\frac{10.5}{7.5} = \frac{x}{11.5}$

So , x (the height of the house) = $\frac{10.5 \times 11.5}{7.5}$ = 16.1 m.

Another solution

The height : The shadow

10.5 : 7.5

x : 11.5

$x = \frac{10.5 \times 11.5}{7.5}$ = 16.1 m.

Example 5

Find the value of x in each of the following proportions :

[a] $\frac{x+5}{3} = \frac{14}{6}$ [b] $\frac{5}{10} = \frac{1.5}{x-4}$

Solution

[a] Since $\frac{x+5}{3} = \frac{14}{6}$ So , $x + 5 = \frac{3 \times 14}{6}$

So , $x + 5 = 7$ therefore $x = 2$

[b] Since $\frac{5}{10} = \frac{1.5}{x-4}$ So , $x - 4 = \frac{1.5 \times 10}{5}$

So , $x - 4 = 3$ therefore $x = 7$



Exercise 7 Properties of proportion


Solve Exercise

From the school book

1 Find the value of x in each of the following proportions :

(a) $\frac{5}{8} = \frac{15}{x}$ (b) $\frac{1}{2} = \frac{6}{x}$ (c) $\frac{2}{7} = \frac{8}{x}$ (d) $\frac{x}{6} = \frac{20}{30}$

(e) $\frac{35}{42} = \frac{x}{6}$ (f) $\frac{4}{5} = \frac{x}{1.25}$ (g) $\frac{x}{5} = 3$ (h) $\frac{24}{x} = 0.8$

2 Use the method of the cross multiplication to find the missing number in each of the following proportions :

(a) $\frac{7}{9} = \frac{\cdots\cdots}{72}$ (b) $\frac{5}{8} = \frac{17.5}{\cdots\cdots}$ (c) $\frac{\cdots\cdots}{21} = \frac{5}{6}$ (d) $\frac{18}{\cdots\cdots} = \frac{27}{49}$

(e) $\frac{28}{49} = \frac{\cdots\cdots}{35}$ (f) $\frac{48}{64} = \frac{7.5}{\cdots\cdots}$ (g) $\frac{\cdots\cdots}{14} = \frac{45}{21}$ (h) $\frac{1.5}{\cdots\cdots} = \frac{2.25}{0.6}$

3 Find the value of x in each of the following proportions :

(a)

3	x
7	14

(b)

5	2
9	x

(c)

1.6	0.8
3.2	x

(d)

5	6
x	0.2

4 Complete each of the following proportions :

(a) $\frac{2}{5} = \frac{6}{\cdots\cdots} = \frac{3}{\cdots\cdots} = \frac{\cdots\cdots}{12\frac{1}{2}} = \frac{\cdots\cdots}{10}$

(b) $\frac{0.3}{0.6} = \frac{\cdots\cdots}{1.2} = \frac{7.5}{\cdots\cdots} = \frac{\cdots\cdots}{1.5} = \frac{10.5}{\cdots\cdots}$

(c) $\frac{2}{6} = \frac{3}{\cdots\cdots} = \frac{\cdots\cdots}{12} = \frac{5}{\cdots\cdots} = \frac{\cdots\cdots}{30}$

(d) $\frac{3}{18} = \frac{\cdots\cdots}{30} = \frac{7}{\cdots\cdots} = \frac{8}{\cdots\cdots} = \frac{\cdots\cdots}{72}$

5 Find the missing term in each of the following for the numbers to be proportional :

(a) 5 , 6 , 10 and ………
(b) ……… , 8 , 16 and 64
(c) 18 , 36 , ……… and 10
(d) 0.8 , 4.8 , ……… and 12
(e) 5 , 10 , $7\frac{1}{2}$ and ………
(f) 6 , ……… , 10 and 3

6 Find the value of x in each of the following for the numbers to be proportional :

(a) 9 , 21 , 3 and x (b) 5 , 25 , x and 10 (c) 3 , 4 , 9 and x

(d) x , 12 , 3 and 4 (e) $1\frac{1}{2}$, $3\frac{1}{2}$, 2.1 and x (f) $7\frac{1}{2}$, x , 2.5 and 4.5

7 Complete :

(a) If $\frac{x}{8} = \frac{3}{4}$, then x = ... (Cairo 2017)

(b) If $\frac{4}{7} = \frac{x}{35}$, then $x - 3$ = ...

(c) If $\frac{x-3}{3} = \frac{5}{3}$, then x = ... (El-Sharkia 2014)

(d) If $\frac{x+5}{3} = 7$, then x = ... (Assiut 2011)

(e) The fourth proportional of 10 , 14 and 20 is ....

(f) If the numbers 2 , 6 , y and 27 are proportional , then y = ... (Aswan 2011)

(g) If x , 18 , 6 and 9 are proportional quantities , then x = ... (Kafr El-Sheikh 2015)

(h) If 2 , x , 8 and 20 are proportional , then x = ... (El-Kalyoubia 2016)

(i) If $\frac{A}{B} = \frac{C}{D}$, then A × D = ... (Souhag 2016)

(j) If $\frac{3}{7} = \frac{12}{y}$, then 3 × y = ... × .... (Suez 2012)

8 Choose the correct answer :

(a) If two ratios are equal , then the product of the extremes .... the product of the means. (El-Dakahlia 2011) (> or < or = or ≠)

(b) .... are equal ratios. ($\frac{2}{3}$, $\frac{4}{9}$ or $\frac{2}{3}$, $\frac{5}{12}$ or $\frac{6}{7}$, $\frac{12}{21}$ or $\frac{2}{3}$, $\frac{10}{15}$)

(c) If $\frac{2}{7} = \frac{x}{21}$, then x = ... (Souhag 2014) (6 or 21 or 12 or 7)

(d) If $\frac{5}{9} = \frac{15}{x}$, then x = ... (El-Gharbia 2017) (3 or 5 or 15 or 27)

(e) If $\frac{8}{x} = 0.5$, then x = ... (Ismailia 2015) (4 or 8 or 16 or 40)

(f) If $\frac{x}{15} = \frac{2}{5}$, then $x + 4$ = ...

(El-Gharbia 2016) (6 or 8 or 10 or 12)

(g) If $\frac{x + 7}{36} = \frac{1}{4}$, then x = ... (Qena 2016) (1 or 2 or 3 or 4)

(h) If $\frac{x + 8}{6} = 2$, then x = ... (Cairo 2012) (2 or 4 or 6 or 12)

(i) If the numbers 4 , x , 12 and 18 are proportional , then the value of x = ... (Red Sea 2017) (6 or 9 or 15 or 18)

(j) The first proportional of 5 , 10 and 20 is ....

(10 or 2.5 or 40 or 50)

(k) If 3 , $x - 1$, 4 and 8 are in proportion , then x = ...

(El-Dakahlia 2014) (5 or 7 or 8 or 9)

(l) If the ratio 7 : 13 is the same ratio x : 52 , then x = ...

(Beni Suef 2015) (14 or 21 or 28 or 35)

(m) If 100 grams of chocolate give 300 calories. What is the number of calories which are found in 30 grams of the same chocolate ?

(Cairo 2016) (90 or 100 or 900 or 9000)

9 Find the value of x in each of the following :

(a) $\frac{x + 1}{2} = \frac{5}{2}$

(b) $\frac{x + 3}{14} = \frac{1}{2}$

(c) $\frac{x - 2}{20} = \frac{1}{4}$

(d) $\frac{7 + x}{16} = \frac{5}{8}$

(e) $\frac{3}{x - 5} = \frac{15}{20}$

(f) $\frac{1}{3} = \frac{4}{x + 7}$

(g) $\frac{3}{4} = \frac{2x}{32}$

(h) $\frac{x - 9}{6} = 2$

(i) $\frac{x + 18}{9} = 8$

(j) $\frac{2x + 30}{4} = 25$

(k) $\frac{5 (x - 3)}{6} = \frac{10}{12}$

10 Ali bought 5 kg. of orange, he paid L.E. 15 How much money does he pay to buy 8 kg. ? **(Qena 2016)**



11 If 35 litres of milk produce out 16 kg. of butter.
Find how many kg. of butter can be produced out of 56 litres of milk.



12 A runner covers 10 kilometres in $2\frac{1}{2}$ hours.
Find the distance he covers in 5 hours at the same speed.



13 If 15 kilograms of flour produce out 150 loaves of bread.
How many loaves of bread can be produced out of 22.5 kg. of flour ?



14 The price of 15 litres of liquid soap is L.E. 7.5
Find :

(a) The price of 45 litres of the same soap.

(b) The number of litres we can buy for L.E. 11.5



2
Lesson

15 A car consumes 20 litres of petrol to cover 210 km.
How many litres of petrol does the car consume to cover 630 km.?



16 A car consumes 16 litres of petrol to cover 152 km. Find :

(a) The number of litres of petrol needed to cover 199.5 km.

(b) The maximum distance which it covers if its tank contains 24 litres of petrol.



17 A car consumes 20 litres of petrol to cover a distance 240 km.
Calculate the consumption rate of the car of petrol and calculate the quantity of petrol needed to cover a distance 600 km.

(Ismailia 2012)



18 A minaret of height 22 m. , the length of its shade at a moment is 6 m.
What is the height of a house neighboured to the minaret if the length of its shade is 3 m. at the same moment ? (El-Beheira 2016)



19 If 4.8 kg. of sugar are needed to make 6 kg. of apricot jam.

(a) How many kg. of the same kind of jam can be made out of 14.4 kg of sugar ?

(b) How many kg. of sugar is needed to make 15 kg. of the same kind of jam ?



20 In Toshka Valley Project , if 3 machines are needed to irrigate 32 feddans every day. Calculate how many machines are needed to irrigate 256 feddans in one day.



21 📖 A primary school , its building height is 14 metres and the shade of this building at a certain moment is 5 m. long.
What is the height of a tree in the same moment if its shade length is 3 metres ?



22 An agricultural machine ploughs 14 feddans in 3.5 hours.

(a) Calculate the rate of work of the machine.

(b) Calculate the number of feddans which the machine ploughs in 5 hours.

(Ismailia 2013)





2 Lesson

For Excellent Pupils

23 Find the value of x :

(a) $\frac{4}{3} = \frac{3x+2}{6}$

(b) $\frac{x}{4} = \frac{25}{x}$, where $x \in \mathbb{N}$



24 A worker can paint a wall in 4 hours.
Another worker can paint the same wall in 2 hours.
If they work together.
How many minutes are needed to paint the wall ?







Lesson 3

Drawing scale



If you took a photo for a tree and you found that the height of this tree in the photo is 8 cm. but its real height is 2 m.

, then this means : 8 cm. in the photo represents 200 cm. in reality.

So, the ratio between the drawing length to the real length = 8 : 200 = 1 : 25 and this ratio is called "drawing scale".

i.e. each 1 cm. in the drawing represents 25 cm. in reality.

This leads to the following rule :

$$\text{Drawing scale} = \frac{\text{Length in drawing}}{\text{Length in reality}}$$

It can be written as : Drawing scale = length in drawing : length in reality

Notice that :

Both lengths should have the same units.



3 Lesson

Example 1

The distance between two cities is 80 km. and the distance between them on a map is 4 cm.
Find the drawing scale and what it means.



Solution

The drawing scale = length in drawing : length in reality

Notice that : 1 km. = 100 000 cm.

4 cm. : 80 km.

4 cm. : 8 000 000 cm. (÷ 4)

1 : 2 000 000

This means that each 1 cm. on the map represents 2 000 000 cm. in reality.

Example 2

A magnified picture of an insect of real length 0.5 mm. was photographed.
If the length of this insect in the picture is 7.5 cm. , calculate the drawing scale and what it means.



Solution

The drawing scale = length in drawing : length in reality

Notice that : 1 cm. = 10 mm.

7.5 cm. : 0.5 mm.

75 mm. : 0.5 mm. (× 10)

750 : 5 (÷ 5)

150 : 1

This means that each 150 mm. in the picture represent 1 mm. in reality.

Remark

If the drawing scale is:

- Less than 1 (< 1), then it refers to minimization (reduction)
  (length in drawing < length in reality)
  For example : maps and geometric figures.
- Greater than 1 (> 1), then it refers to enlargement (magnification)
  (length in drawing > length in reality)
  For example : a picture for a small insect.

Try by yourself

A magnifying glass is used to magnify an insect of real length 0.5 mm. If its magnified length is 5 cm.
Find the ratio of magnification.



Example 3

The distance between two cities on a map is 3.6 cm. and the map was drawn with a drawing scale 3 : 5 000 000
Find the real distance between the two cities in kilometres.



Solution

Length in drawing : Length in reality

3 : 5 000 000

3.6 cm. : ?

The real distance $= \frac{3.6 \text{ cm.} \times 5\,000\,000}{3}$

$= 6\,000\,000$ cm.

Convert it into km. by dividing it by 100 000

$= \frac{6\,000\,000}{100\,000} = 60$ km.

3
Lesson

Example 4

The real distance between two cities is 24 km. If the drawing scale of a map is 1 : 400 000 Find the map distance between these two cities on this map in cm.



Solution

Length in drawing : Length in reality

1 : 400 000

? : 24 km.

The map distance = $\frac{1 \times 24 \text{ km.}}{400\ 000} = \frac{24 \times 100\ 000 \text{ cm.}}{400\ 000} = 6$ cm.

Try by yourself

A map is drawn with a scale 1 : 500 000 , find the real distance between two cities on this map in kilometres given that the map distance between them is 7 cm.

Example 5

A building of height 80 m. was pictured by a scale 1 : 2 000 Find the height of this building in the picture.



Solution

Length in drawing : Length in reality

1 : 2 000

? : 80 m.

The height in the picture = $\frac{1 \times 80 \text{ m.}}{2\ 000} = \frac{80 \times 100 \text{ cm.}}{2\ 000} = 4$ cm.

Exercise 8 Drawing scale


Solve Exercise

From the school book

1 Complete the following table :

	The drawing distance	The real distance	The scale	Magnification or reduction
(a)	5 cm.	15 km.	....	....
(b)	12 cm.	.... m.	1 : 200	....
(c)	.... cm.	5 mm.	50 : 1	....
(d)	4.8 dm.	16 km.	....	....
(e)	10 cm.	.... km.	1 : 400 000	....
(f)	.... cm.	2.1 mm.	300 : 7	....
(g)	.... cm.	15 km.	1 : 100 000	....
(h)	.... cm.	65 km.	1 : 500 000	....

2 Complete each of the following :

(a) The drawing scale = $\frac{\text{..................}}{\text{..................}}$ (El-Kalyoubia 2016)

(b) If the length in a drawing is 2 cm. and the real length is 6 metres , then the drawing scale = ... : .... (El-Beheira 2012)

(c) The length of an insect on a picture is 4 cm. and its real length is 2 millimetres , then the drawing scale is .... (Red Sea 2015)

(d) If the height of a building is 20 m. , then its height in cm. on a picture of a drawing scale 1 : 100 is ....

(e) If the drawing scale is 1 : 1 000 and the drawing length is 2.5 cm. , then the real length = ... m. (El-Monofia 2011)

(f) If the drawing scale is 1 : 2 000 000 and the map length is 3 cm. , then the real length = ... km.

(g) If the drawing scale < 1 , this expresses .... (Giza 2017)

(h) If the drawing scale > 1 , this expresses .... (Ismailia 2013)

(i) The real length = $\frac{\dots\dots\dots\dots}{\dots\dots\dots\dots}$

(j) The length in drawing = ... × ....

(k) A piece of land in the shape of an equilateral triangle of perimeter 180 m. is represented on a drawing by a triangle of side length 4 cm. , then the ratio of reduction is ....

---

3 Choose the correct answer :

(a) If the drawing length of an object is 2 cm. and its real length equals 20 metres , then the drawing scale equals .... (El-Beheira 2014)
(1 : 10 *or* 1 : 100 *or* 1 : 1 000 *or* 1 : 10 000)

(b) If the drawing length is 7 cm. and the real length is 28 metres , then the drawing scale = ... : .... (El-Fayoum 2016)
(1 : 40 *or* 1 : 400 *or* 400 : 1 *or* 1 : 4)

(c) If the real length of an insect is 0.3 mm. and its length after magnification is 4.5 cm. , then the ratio of magnification is ....
(1 : 15 *or* 15 : 1 *or* 1 : 150 *or* 150 : 1)

(d) If the length in drawing is 63 mm. and the real length is 700 m. , then the drawing scale = ... : .... (Ismailia 2012)
(9 : 100 *or* 9 : 1 000 *or* 9 : 10 000 *or* 9 : 100 000)

(e) A building of height 90 m. was drawn with a scale 1 : 10 000 , then its height in the drawing equals .... cm. (0.9 *or* 9 *or* 90 *or* 0.09)

(f) If the height of a tree in a picture of scale 1 : 100 is 1.5 cm. , then the real height of this tree is .... (El-Kalyoubia 2014)
(15 cm. *or* 15 m. *or* 0.15 m. *or* 1.5 m.)

(g) If the length of Suez Canal on a map of drawing scale 1 : 1 100 000 is 15 cm. , then its real length in km. equals ……… (El-Beheira 2015)

(155 or 165 or 170 or 185)

(h) A map is drawn such that each 1 cm. on it represents 5 km. in reality. If the distance between two villages is 25 km., then the distance between them on this map equals ……… cm. (Damietta 2015)

(15 or 10 or 5 or 3)

(i) If you draw a map with a drawing scale 1 : 6 000 000 , then each 1 cm. on the map represents ……… in reality. (6 km. or 60 km. or 600 km.)

(j) The drawing length ……… the real length in magnification.

(> or = or <)

(k) The drawing scale ……… expresses enlargement.

(1 : 20 or 1 : 50 000 or 1 : 10 or 50 : 1)

---

4 If the distance between two cities on a map is 3 cm. and the real distance between them is 9 km. Find the drawing scale of the map. (El-Fayoum 2014)



---

5 If the distance between two cities is 40 km. and the distance between them on a map is 8 cm.

Find the drawing scale of this map. (Giza 2012)



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6 If the height of the Cairo Tower is 180 m. and its length in one of the pictures is 6 cm.

Calculate the drawing scale of that picture. (El-Dakahlia 2016)



3
Lesson

7 A lense was used to enlarge an insect of real length 0.4 mm. and its length after enlargement is 4.8 cm.
Calculate the ratio of enlargement.
(Souhag 2015)



8 A butterfly is of length 3.75 mm.
Find the drawing scale if its photo length is 0.027 m.



9 Ahmed drew a picture of his brother Osama with a drawing scale 1 : 40
If the real height of Osama is 160 cm.
What is his height in the picture ?
(Alexandria 2017)



10 A picture of a natural scene is drawn with a drawing scale 1 : 100
If the real height of a tree is 8 metres.
Find its length in the picture. (Giza 2011)



11 A picture of the Cairo Tower was photographed with a scale 1 : 7 000
Find the real height of the tower if its height in the picture is 2.7 cm.



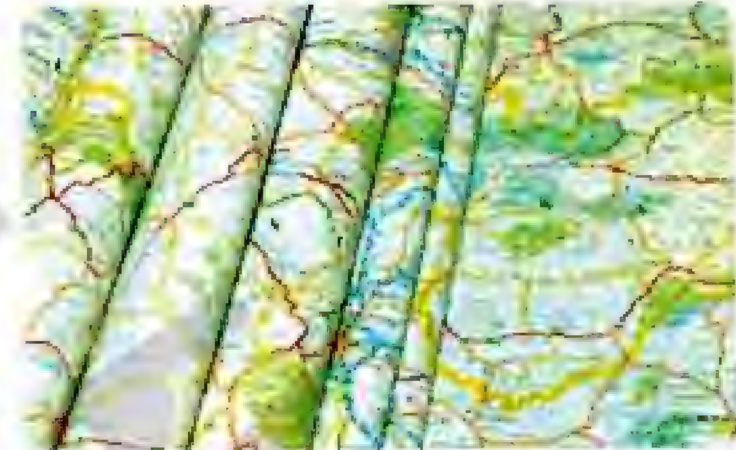
12 A map was drawn with a scale 1 : 300 000
If the distance between two cities on the map was 14 cm.
Find the real distance between these two cities in kilometres.



13 If the distance between two cities on a map of drawing scale 1 : 500 000 equals 3 cm.
Find the real distance between the two cities.
(Cairo 2017)



14 A map is drawn with a scale 1 : 200 000
If the distance between two cities on this map is 5 cm.
Find the real distance between these cities in km. **(El-Dakahlia 2011)**



15 If the drawing scale of a map is 1 : 100 000 and the length of a road equals 5 km.
What is the length of the road on the map ?
(Port Said 2016)



16 If the real distance between two cities is 180 kilometres and the drawing scale of a map is 1 : 9 000 000
What is the distance between them on the map ? **(El-Sharkia 2017 , Cairo 2015)**



3 Lesson

17 A magnified picture of an insect was taken with an enlargement ratio 100 : 1 , if the length of the insect in the picture is 2.5 cm. What is the real length of the insect ?

(Souhag 2013)



18 A picture of a building is taken with a drawing scale 1 : 1 000 , if the height of the building in the picture is 3 cm. What is its real height ? (Alexandria 2015)



19 An engineer drew a map of a garden with a scale 3 : 500 , if the side length of the garden on the map is 3.6 cm. Find the real side length of this garden.



20 A microscope was used to magnify an insect of real length 0.8 mm. in the ratio 100 : 1 Calculate the length of the insect after magnification.



21 If the distance between two cities on a map is 10 cm. and the real distance between them is 120 km. Find the drawing scale of the map , and if the distance between two other cities on the same map is 6 cm. Calculate the real distance between them.



22 If the distance between two cities on a map is 5 cm. and the real distance between them is 10 km., find the drawing scale of the map. And if the distance between two other cities on the same map is 3 cm. Calculate the real distance between them in kilometres.



(Alexandria 2011)

23 An insect was magnified 300 times, if its real length is 0.02 cm. Find its length after magnification.



24 A map is drawn with a drawing scale 1 : 500 000 and the distance between two cities on the map is 6.8 cm. Find the real distance between those two cities in kilometres. If the distance between the same two cities on another map is 4.25 cm., what is the drawing scale of that map ?





For Excellent Pupils

25 A piece of land is in the shape of a square of real perimeter 240 m. What is the side length of it in a drawing with a scale 1 : 200

26 The opposite figure represents a square garden of side length 50 metres. It is drawn in a drawing scale 1 : 1 000 Find its area in the drawing.



3
Lesson

27 A rectangular piece of land of area 1 200 m^2, it is drawn in a drawing scale 1 : 200 , if its length in drawing is 20 cm. Find :



(a) The real length of the land.

(b) The real width of the land. **(Qena 2016)**

28 An engineer drew a map of a rectangular garden with a scale 1 : 2 000
Find the real area of this garden if its dimensions on the map are 7.2 cm. and 4.8 cm.



29 A picture of an insect with dimensions 9 mm. and 36 mm. is magnified where its dimensions became 5.4 cm. and x cm. respectively. Find :



(a) The magnification ratio.

(b) The value of x in cm.

30 Two maps for Upper Egypt are drawn such that the scale of the first is 1 : 40 000 and the second is 1 : 100 000
If the distance between two cities on the first map is 10 cm.
Find the distance between the same two cities on the second map.



Lesson **4**

Proportional division

Proportional division is to divide anything (money , land , weights , ...) according to a given ratio.

Example 1



Distribute L.E. 108 among three persons in the ratio 2 : 3 : 4

Solution

The sum of parts = 2 + 3 + 4 = 9 equal parts.

Then , the value of each part = 108 ÷ 9 = L.E. 12

So , The share of the first person = 2 × 12 = L.E. 24

The share of the second person = 3 × 12 = L.E. 36

The share of the third person = 4 × 12 = L.E. 48

Another solution

First person	:	Second person	:	Third person	:	Sum
2	:	3	:	4	:	9
?	:	?	:	?	:	108

- The share of the first person = $\frac{2 \times 108}{9}$ = L.E. 24
- The share of the second person = $\frac{3 \times 108}{9}$ = L.E. 36
- The share of the third person = $\frac{4 \times 108}{9}$ = L.E. 48



4
Lesson

Example 2

Distribute a number of oranges among Sally , Abeer and Nihal in the ratio 7 : 4 : 2 , if the share of Sally exceeds the share of Abeer by 18 oranges.

Find the share of each one.



Solution

Sally	:	Abeer	:	Nihal	:	Difference
⑦	:	④	:	2	:	3
?	:	?	:	?	:	18

Sally – Abeer = 7 – 4 = 3

- The share of Sally = $\frac{7 \times 18}{3}$ = 42 oranges.
- The share of Abeer = $\frac{4 \times 18}{3}$ = 24 oranges.
- The share of Nihal = $\frac{2 \times 18}{3}$ = 12 oranges.

Example 3

There are 980 passengers in a train. If the number of passengers in the first class is $\frac{2}{3}$ of the number of passengers in the second class and the number of passengers in the second class is $\frac{5}{8}$ of the number of passengers in the third class. Find the number of passengers in each class.



Solution

First class	:	Second class	:	Third class	:	Sum
2	:	3	:			
	:	5	:	8		
10	:	15	:	24	:	49
?	:	?	:	?	:	980

- The number of passengers in the first class = $\frac{10 \times 980}{49}$ = 200 passengers.
- The number of passengers in the second class = $\frac{15 \times 980}{49}$ = 300 passengers.
- The number of passengers in the third class = $\frac{24 \times 980}{49}$ = 480 passengers.

Try by yourself

Divide L.E. 3 600 among three persons such that the ratio between the share of the first and the share of the second is 4 : 3 and the share of the third is $\frac{1}{2}$ the share of the first.
Find the share of each person.

Example 4

A man died leaving a capital of L.E. 60 000 to be distributed among his wife , a son and two daughters. If the share of the wife is $\frac{1}{8}$ of the capital and the share of the son is twice that of one daughter. Calculate the share of the wife , the son and each of his daughters.

Solution

- The share of the wife = 60 000 × $\frac{1}{8}$ = L.E. 7 500

So , the share of his children = 60 000 – 7 500 = L.E. 52 500

If the share of one daughter = 1 part.



Then , the share of the son = 2 parts.

So , the total number of parts of 1 son and 2 daughters = (1 × 2) + (2 × 1)

= 4 equal parts.

- The value of each part = $\frac{52\ 500}{4}$ = L.E. 13 125
- The share of the son = 2 × 13 125 = L.E. 26 250
- The share of each daughter = 1 × 13 125 = L.E. 13 125

Example 5

Three persons shared in a commercial project with a capital of 18 000 pounds. The first paid 4 000 pounds , the second paid 6 000 pounds and the third paid the rest. At the end of the year , the net profit was 1 980 pounds. Calculate the profit of each of them.

Solution

What the third person paid = 18 000 – (4 000 + 6 000) = 8 000 pounds.

First person	:	Second person	:	Third person	:	Sum
4 000	:	6 000	:	8 000	:	
4	:	6	:	8	:	
2	:	3	:	4	:	9
?	:	?	:	?	:	1 980

- The profit of the first person = $\frac{2 \times 1980}{9}$ = 440 pounds.
- The profit of the second person = $\frac{3 \times 1980}{9}$ = 660 pounds.
- The profit of the third person = $\frac{4 \times 1980}{9}$ = 880 pounds.

Example 6

Maher , Said and Tamer started a business. Maher paid L.E. 6 000 , Said paid L.E. 4 500 and Tamer paid L.E. 7 500. At the end of the year , their company lost L.E. 2 760 Find the loss of each of them.

Solution

Maher	:	Said	:	Tamer	:	Sum	
6 000	:	4 500	:	7 500	:		(÷ 100)
60	:	45	:	75	:		(÷ 15)
4	:	3	:	5	:	12	
?	:	?	:	?	:	2 760	

- The loss of Maher = $\frac{4 \times 2\,760}{12}$ = L.E. 920
- The loss of Said = $\frac{3 \times 2\,760}{12}$ = L.E. 690
- The loss of Tamer = $\frac{5 \times 2\,760}{12}$ = L.E. 1 150

Notice that :

The net profit (or loss) is distributed proportional to the capital paid.
Capital may be in the form of money , land , goods , ...

Try by yourself

Makram , Adel and Raafat started a commercial business. Makram paid L.E. 20 000 , Adel paid L.E. 16 000 and Raafat paid L.E. 14 000
At the end of the year , the net profit was L.E. 5 000
Find the profit of each of them.

4
Lesson

Example 7

Amir , Ramzy and Omar started a business. Amir paid $\frac{3}{5}$ of what Ramzy paid and Omar paid $\frac{3}{4}$ of what Amir paid. At the end of the year , the profit was L.E. 25 000. Amir took L.E. 4 500 for management and the net profit was shared in proportion to what they paid. Find the share of each one of the profit.

Solution

The net profit = 25 000 – 4 500 = L.E. 20 500

Amir	:	Ramzy	:	Omar	:	Sum
3	:	5	:		:	
4	:		:	3	:	
12	:	20	:	9	:	41
?	:	?	:	?	:	20 500

- The share of Amir = $\frac{20\,500 \times 12}{41}$ = L.E. 6 000
- The share of Ramzy = $\frac{20\,500 \times 20}{41}$ = L.E. 10 000
- The share of Omar = $\frac{20\,500 \times 9}{41}$ = L.E. 4 500
- The total share of Amir = 4 500 + 6 000 = L.E. 10 500

Exercise 9 Proportional division


Solve Exercise

📖 From the school book

1 A sum of money 360 pounds was distributed between Hany and Ahmed in the ratio 7 : 5
Find the share of each of Hany and Ahmed. **(Cairo 2015)**

2 Divide L.E. 450 between Hassan and his cousin Shaymaa where the share of Hassan is $\frac{2}{3}$ of Shaymaa's share.

3 📖 A piece of building land was distributed between two brothers in the ratio 7 : 5
If the share of the first exceeds the share of the second by 80 square metres.
Find the area of the land and the share of each of the first and the second. **(Assiut 2017)**

4 A sum of money is divided between two persons in the ratio 3 : 5 , if the share of the second exceeds the share of the first by L.E. 30
Find the share of each of them. **(El-Gharbia 2015)**

5 A man distributed 8000 pounds among his sons in the ratio 1 : 2 : 5
Calculate the share of each of them. **(Ismailia 2016)**

6 Samy , Nabil and Wael started a business , they invested amounts of money in the ratio 3 : 4 : 5 , at the end of the first year , the net profit was L.E. 36 000 According to the ratio of their investments , calculate the profit of each of them.

7 A factory produces three types of washing machines A , B and C in the ratio 6 : 4 : 3
If the production of B exceeds the production of C by 6
Find the production of each type.

8 📖 A father distributed L.E. 225 among his three sons.The share of the first was third of the sum and the ratio between the share of the second and the share of the third is 2 : 3 Find the share of each of them.

---

9 A man distributed 6 300 pounds among his three sons , if the share of the first was third of the money and the ratio between the share of the second and the third equals 3 : 2

Find the share of each of them. (El-Sharkia 2017 , Kafr El-Sheikh 2016)

---

10 📖 A triangular garden in a school , the ratio among its side lengths is 3 : 4 : 5

If the perimeter of the garden is 120 metres.

Calculate the lengths of the sides of the garden.

---

11 Three persons shared in a trade , the first paid 50 000 pounds , the second paid 40 000 pounds and the third paid 30 000 pounds. At the end of the year , the profit was 36 000 pounds.

Find the share of each in profit. (Ismailia 2017)

---

12 Three persons started a commercial business for flowers.

The first paid L.E. 9 000, the second paid L.E. 5 400 and the third paid L.E. 7 200

At the end of the year , the profit was L.E. 1 800

Find the profit of each one.

---

13 Three persons involved in a business , the first paid L.E. 60 000 , the second paid L.E. 80 000 and the third paid L.E. 90 000

At the end of the year , the profit was L.E. 20 700

Find the profit of each person. (Cairo 2016)

14 Siham , Sherief and Magdy started a business , Siham paid L.E. 5 000 , Sherief paid L.E. 3 000 and Magdy paid L.E. 4 000 At the end of the year , the sum of the profits of Sherief and Magdy was L.E. 1 610
Find the profit of each one.

15 🕮 Hani , Khaled and Fady shared a commercial business , Hani paid L.E. 30 000 , Khaled paid L.E. 40 000 and Fady paid L.E. 50 000
At the end of the year , the loss was L.E. 6 000
Find the loss of each of them.

16 🕮 Three persons set up a commercial business for flowers.
The first paid L.E. 6 000 , the second paid L.E. 4 800 and the third paid L.E. 7 200
At the end of the year , the profit of the first was L.E. 240 more than the profit of the second.
Find the profit of each of the second and the third.



17 Three persons started a project. The first paid L.E. 30 000 , the second paid L.E. 35 000 and the third paid twice of what the first paid.
If the project profit was L.E. 25 000
Find the profit of each person.

18 Three persons shared in a trade , the first paid L.E. 30 000 , the second paid L.E. 24 000 and the third paid half of sum of what the first and the second paid. At the end of the year , the profit was L.E. 2 700
Find the profit of each person. (El-Dakahlia 2012)

19 🕮 Three people established a food business.
The first paid L.E. 35 000 , the second paid L.E. 25 000 and the third paid L.E. 20 000
At the end of the first year , they lost L.E. 16 000 , which was deducted from the capital. Calculate the capital of each person at the beginning of the second year.



4 Lesson

20 ABC is a triangle in which m (∠ A) = $\frac{2}{3}$ m (∠ B) and m (∠ C) = 2 m (∠ A)
Find the measure of each angle.

21 In a train , there are 700 passengers.
If the number of passengers in the first class = $\frac{2}{3}$ the number in the second class and the number of passengers in the second class = $\frac{4}{5}$ the number in the third class.
Find the number of passengers in each class.



22 For solving the illiteracy problem at a village , 3 classes have been opened for solving this problem , the number of learners was 92 persons. If the number of learners in the 1st class = $\frac{2}{3}$ the number of learners in the 2nd class and the number of learners in the 2nd class = $\frac{5}{7}$ the number of learners in the 3rd class.
Find the number of learners in each class.



23 A load of apple fruit weights 280 kg. is distributed among three merchants , the share of the first = $\frac{2}{3}$ the share of the second and the share of the second = $\frac{4}{5}$ the share of the third.
Calculate the share of each of them from this load. (Giza 2016)



24 Three persons formed a company , the first paid $\frac{2}{3}$ of what the second paid , the third paid twice of what the first paid , at the end of the year , the total profit is L.E. 3 600
Calculate the profit of each one. (El-Dakahlia 2014)

25 A sum of money is distributed among three persons , the share of the first = $\frac{2}{3}$ the share of the second , the share of the third = $\frac{4}{5}$ the share of the second , if the share of the first is L.E. 240
Find the share of the second. (Damietta 2014)



26 Hashem , Metwally and Hamed started a chicken farm project. Hashem paid $\frac{3}{5}$ as much as Metwally and Metwally paid $\frac{1}{3}$ as much as Hamed.
At the end of the year , Metwally profited L.E. 150 less than Hamed.
Find the profit of each.

---

27 Three persons started a business. The first paid $\frac{5}{6}$ of what the third paid and the second paid $\frac{7}{9}$ of what the third paid. At the end of the year , the profit of the first was L.E. 3 000 including L.E. 750 for his management.
Find the profit of the second and of the third.

---

28 Three persons started a business , the first paid 350 000 pounds , the second paid 250 000 pounds and the third paid $\frac{1}{3}$ of sum of what the first and the second paid. At the end of the year , the loss was 160 000 pounds subtracted from the capital.
Find the captial of each one of them at the start of the second year.



29 A , B and C started a chicken farm project. At the end of the year , the profit was L.E.120 000 , A took $\frac{1}{10}$ of the profit for his management and the rest was distributed in the ratio 6 : 7 : 5
Find the share of each one.



30 📖 A man owns a piece of land whose area is 48 kirats. He recommended that the half of the area is specialized for building a school. And the other half is divided among his two sons and his two daughters such that the share of the boy is twice the share of the girl.
Calculate the share of each of them.

4 Lesson

31 A man died and left 24 000 pounds to his wife , two boys and a girl , the wife's share is $\frac{1}{8}$ of the amount and the share of the boy is twice the share of the girl.
Find the share of each of the wife , the boy and the girl. **(El-Gharbia 2016)**

32 A man died and left L.E. 48 000 to be divided among his wife , 3 boys and 4 girls. The wife should take $\frac{1}{8}$ of the capital and each boy should take twice as much as each girl.
Calculate the share of the wife and of each boy and girl.



For Excellent Pupils

33 Ayman , Mostafa and Kamal set up a grocery shop business. They paid L.E. 6 000 , L.E. 8 000 and L.E. 14 000 respectively. At the end of the year , the profits were L.E. 4 900 , if $\frac{1}{4}$ of profits was paid for tax , $\frac{3}{7}$ of profits was kept as reserve and the remainder was shared among them in the ratio of their capitals.



(a) What was the rest of profit shared among them ?
(b) What was the profit share for each of them ?

34 Ahmed started a food business for L.E. 45 000 , after 4 months , Ali participated in the project for L.E. 45 000 , and after 6 months from the starting this project , Fady participated for L.E. 45 000 , at the end of the year , the profit was L.E. 74 880
Calculate the profit of each of them.



35 If 132 pieces of chocolate are distributed among 5 boys and 9 girls such that the share of the girl is $\frac{2}{3}$ of the share of the boy.
Find the share of each one.





Lesson 5

Percentage

- A percentage is a ratio its second term is 100
- A percentage means "per hundred" or "hundredths".

For example :

In a school , if the ratio of the number of 6^{th} grade students to the number of all students is 3 to 20 (which equals 15 to 100). That means the number of 6^{th} grade students is 15 per hundred of the number of all the students of the school.

The ratio $\frac{15}{100}$ could be expressed as 15 % (read as 15 percent) , so you can say that "15 % of the students of this school are in the 6^{th} grade".

Converting a percentage into a fraction

Example 1

Convert each of the following percentages into a fraction in its simplest form :

[a] 27 %	[b] 69 %	[c] 7 %
[d] 25 %	[e] 45 %	[f] 80 %



5 Lesson

Solution

[a] $27\ \% = \frac{27}{100}$

[b] $69\ \% = \frac{69}{100}$

[c] $7\ \% = \frac{7}{100}$

[d] $25\ \% = \frac{25}{100} = \frac{1}{4}$

[e] $45\ \% = \frac{45}{100} = \frac{9}{20}$

[f] $80\ \% = \frac{80}{100} = \frac{4}{5}$

Converting a fraction into a percentage

Example 2

Convert each of the following fractions into a percentage :

[a] $\frac{2}{5}$ [b] $\frac{8}{25}$ [c] $\frac{3}{8}$ [d] $\frac{5}{6}$

Solution

[a] $\frac{2}{5} = \frac{2 \times 20}{5 \times 20} = \frac{40}{100} = 40\ \%$ or $\frac{2}{5} = \frac{2}{5} \times 100\ \% = 40\ \%$

[b] $\frac{8}{25} = \frac{8 \times 4}{25 \times 4} = \frac{32}{100} = 32\ \%$ or $\frac{8}{25} = \frac{8}{25} \times 100\ \% = 32\ \%$

[c] $\frac{3}{8} = \frac{3}{8} \times 100\ \% = 37.5\ \%$

[d] $\frac{5}{6} = \frac{5}{6} \times 100\ \% = 83\frac{1}{3}\ \%$

Converting a decimal into a percentage

Example 3

Convert each of the following decimals into a percentage :

[a] 0.37 [b] 0.099 [c] 0.3 [d] 0.625

Solution

[a] $0.37 = \frac{37}{100} = 37\ \%$

[b] $0.099 = \frac{99}{1000} = \frac{9.9}{100} = 9.9\ \%$

[c] $0.3 = \frac{3}{10} = \frac{30}{100} = 30\ \%$

[d] $0.625 = \frac{625}{1000} = \frac{62.5}{100} = 62.5\ \%$

Also , to convert a decimal into a percentage , multiply it by 100

Converting a percentage into a decimal

Example 4

Convert each of the following percentages into a decimal :

[a] 1.5 % [b] 4.2 % [c] $16\frac{1}{5}$ % [d] $12\frac{1}{4}$ %

Solution

[a] $1.5\ \% = \frac{1.5}{100} = \frac{15}{1000} = 0.015$

[b] $4.2\ \% = \frac{4.2}{100} = \frac{42}{1000} = 0.042$

[c] $16\frac{1}{5}\ \% = \frac{16.2}{100} = \frac{162}{1000} = 0.162$

[d] $12\frac{1}{4}\ \% = \frac{12.25}{100} = \frac{1225}{10\ 000} = 0.1225$

Also , to convert a percentage into a decimal , divide it by 100

Try by yourself

Complete the following table :

Percentage	Fraction in a simplest from	Decimal
13 %	$\frac{......}{100}$	....
.... %	$\frac{57}{100}$	....
60 %	$\frac{......}{100} = \frac{......}{......}$	....
.... %	$\frac{......}{100} = \frac{......}{......}$	0.75
.... %	$\frac{3}{5}$	....

Using percentage in real life

For example :

- You can see in a bank a sign saying "PROFIT 9 %". This means for every L.E. 100 , you take a profit L.E. 9

  At the end of the year you can take L.E. 109

9%

5 Lesson



- If you read that a shop is making a discount of 30 %, this means that for purchases of value L.E. 100, they give a discount of L.E. 30, then the price after discount will be L.E. 70



- A suit has a sign saying that it is made of cloth with 35 % cotton , and the rest is wool. This means that the percentage of wool = 100 % – 35 % = 65 % because the sum of percentages of all contents of this cloth should be equal to 100 %

Notice that :

- $100\ \% = \frac{100}{100} = 1$
- 100 % of a quantity denotes the whole quantity.

Example 5

Complete each of the following :

[a] If the percentage of success in a school is 76 % , then the percentage of failures is .... %

[b] $90\ \% - (22\ \% + 43\ \%) = \frac{.....}{.....}$

[c] 1 – (15 % + 55 %) = ... %

[d] In the opposite figure :



[1] The percentage of the coloured part to the whole figure = ... %

[2] The percentage of the uncoloured part to the whole figure = ... %

Solution

[a] The percentage of success + the percentage of failures = 100 %

So , the percentage of failures = 100 % – 76 % = 24 %

[b] 90 % – (22 % + 43 %) = 90 % – 65 % = 25 % = $\frac{1}{4}$

[c] 1 – (15 % + 55 %) = 100 % – (15 % + 55 %) = 100 % – 70 % = 30 %

[d] [1] The percentage of the coloured part to the whole figure

$= \frac{4}{10} \times 100\ \% = 40\ \%$

[2] The percentage of the uncoloured part to the whole figure

$= \frac{6}{10} \times 100\ \% = 60\ \%$

or the percentage of the uncoloured part to the whole figure

= 100 % – 40 % = 60 %

Example 6

Find the value of each of the following :

[a] 12 % of 500 kg.

[b] 40 % of L.E. 800

Solution

[a] 12 % of 500 kg. = $\frac{12}{100} \times 500$ = 60 kg.

[b] 40 % of L.E. 800 = $\frac{40}{100} \times 800$ = L.E. 320

Notice that :
We change "of" into multiplication operation "×"

Example 7

If 35 % of a number is 140 , find this number.

Solution

35 % of a number = 140

$\frac{35}{100} \times$ ……… = 140

The number = $\frac{100}{35} \times 140 = 400$

5 Lesson

Try by yourself

Complete :

[a] 15 % of 540 = ………

[b] 32 % of 300 gm. = ………

[c] 5 % of ……… = L.E. 20

[d] 2 % of ……… = 24

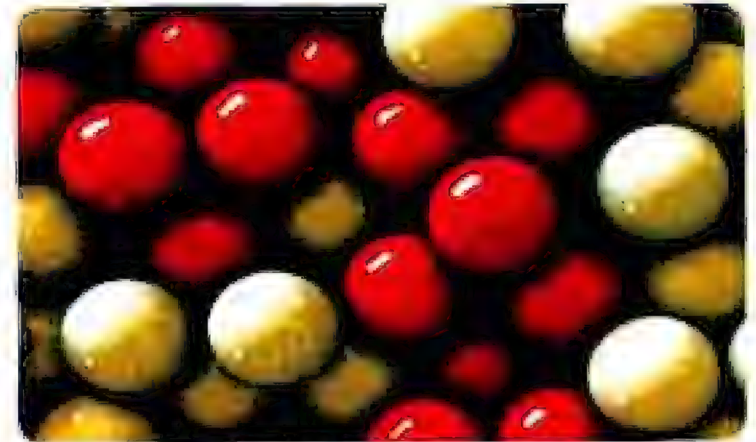
[e] 70 % + 12 % + ……… % = 98 %

[f] $1 - (27\,\% + \frac{1}{2}) =$ ……… %

[g] If the percentage of boys in a school is 62 % , then the percentage of girls is ……… %

Example 8

A basket contains 48 balls such that 30 balls are red and the rest are white. Find the percentage of each kind.



Solution

The number of white balls = 48 – 30 = 18 balls.

$$\text{The percentage of red balls} = \frac{\text{the number of red balls}}{\text{the whole number}} \times 100\,\%$$

$$= \frac{30}{48} \times 100\,\% = 62.5\,\%$$

$$\text{The percentage of white balls} = \frac{\text{the number of white balls}}{\text{the whole number}} \times 100\,\%$$

$$= \frac{18}{48} \times 100\,\% = 37.5\,\%$$

Try by yourself

There are 250 pupils in a school , 15 pupils of them were absent one day. Find the percentage of absentees on that day.

Example 9



An employee saves L.E. 300 monthly. If his monthly income is L.E. 2500 Find the percentage of what he saves monthly.

Solution

The percentage of what he saves = $\frac{300}{2500} \times 100\ \% = 12\ \%$

Example 10



The number of pupils in a school is 720 One day , 7.5 % of them were absent. Find the number of the present pupils that day.

Solution

The number of absent pupils = $\frac{7.5}{100} \times 720 = 54$ pupils.

So , the number of present pupils = 720 – 54 = 666 pupils.

Another solution

Since the percentage of absent pupils = 7.5 %

Then , the percentage of present pupils = 100 % – 7.5 % = 92.5 %

So , the number of present pupils = $\frac{92.5}{100} \times 720 = 666$ pupils.

Exercise 10 Percentage


Solve Exercise

From the school book

1 Convert each of the following into a fraction in the simplest form :

(a) 2 % (b) 48 % (c) 70 % (d) 63 %

(e) 75 % (f) 10.5 % (g) 37.5 % (h) $33\frac{1}{3}$ %

2 Convert each of the following into a percentage :

(a) $\frac{5}{8}$ (b) $\frac{3}{5}$ (c) $\frac{13}{200}$ (d) 13 : 25 (e) 1.5 : 2.25

3 Convert each of the following into a percentage :

(a) 0.4 (b) 0.405 (c) 0.06 (d) 0.2514 (e) 0.0375

4 Convert each of the following into a decimal :

(a) 5.6 % (b) 45.5 % (c) 0.02 % (d) $43\frac{1}{4}$ % (e) $37\frac{1}{2}$ %

5 Complete each of the following :

(a) The percentage is a ratio .... (Qena 2015)

(b) $\frac{3}{4}$ = ... % (El-Kalyoubia 2012)

(c) 0.825 = ... % (Kafr El-Sheikh 2012)

(d) 62.5 % = $\frac{\text{..........}}{8}$ (El-Beheira 2017)

(e) 36 % + 24 % – 17 % = ...

(f) 28 % + 52 % + ... = 1

(g) 15 % + 0.35 + $\frac{1}{2}$ = ... %

(h) 76 % + 41 % – .... = 100 % (El-Sharkia 2015)

(i) 100 % – (43 % + 35 %) = ... %

(j) 0.35 + $\frac{9}{20}$ = ... %

(k) $\frac{3}{7} \times \frac{7}{3}$ = ... %

(l) 225 % – $1\frac{1}{4}$ = ...

(m) $1 - (39\ \% + 0.21) = \dots\dots$ (Damietta 2016)

(n) $15\ \% - 0.15 = \dots\dots$

(o) $1 - \frac{3}{4} = \dots\dots\ \%$

(p) $12\ \% \div 4\ \% = \dots\dots$

(q) $15\ \% + 10\ \% + \frac{3}{4} = \dots\dots\ \%$ (Aswan 2012)

(r) If 8 % of the students are absent , then .... % of them are present.

6 **Complete each of the following :**

(a) 23 % of 300 = ...

(b) 45 % of 200 = ...

(c) $6\frac{1}{4}$ % of 400 kg. = ... kg.

(d) 12 % of 400 m. = ... cm.

(e) 15 % of .... = 75

(f) $33\frac{1}{3}$ % of .... = 20

(g) 9 % of .... kg. = 72 kg.

(h) .... % of 240 = 60

(i) .... % of L.E. 600 = L.E. 120

(j) If 25 % of a number = 120 , then this number = ...

(k) 12 % of .... = 20 % of 300

7 **Find the value of x in each of the following :**

(a) 📖 $\frac{x}{9} = 15\ \%$

(b) $\frac{x}{12} = 36\ \%$

(c) $\frac{2}{x + 8} = 5\ \%$

(d) $\frac{x + 6}{20} = 50\ \%$

(e) $\frac{x - 2}{100} = 25\ \%$

(f) $\frac{3x}{2} = 75\ \%$

8 **Choose the correct answer between brackets :**

(a) $1\frac{3}{4} = \dots\dots\ \%$ (Cairo 2015) (25 or 75 or 125 or 175)

(b) L.E. 1.5 : P.T. 120 = ... % (1.25 or 12.5 or 25 or 125)

(c) 50 % = ... ($\frac{1}{4}$ or 0.5 or 5 or 50)

(d) 30 % + 40 % = ... (70 or 7 or 0.7 or 0.07)

(e) 1 – 25 % = ... ($\frac{3}{4}$ or $\frac{1}{4}$ or $\frac{1}{8}$ or $\frac{3}{8}$)

(f) $10\ \% + \frac{9}{20} = \cdots\cdots\ \%$ (Alexandria 2011) (35 or 45 or 55 or 65)

(g) $20\ \% \div \frac{1}{4} = \cdots\cdots\ \%$ (El-Dakahlia 2014) (5 or 40 or 60 or 80)

(h) 20 % of 40 kg. = ········ kg. (Giza 2016) (4 or 8 or 12 or 16)

(i) 45 % of a kilometre = ········ m. (450 or 4 500 or 45 or 0.45)

(j) If a : b = 50 % , b : c = 2 : 3 , then a : c = ········ (El-Dakahlia 2015)

(1 : 2 or 2 : 3 or 1 : 3 or 3 : 1)

(k) If $\frac{x}{9} = 5\ \%$, then x = ········ (Luxor 2015) (0.45 or 4.5 or 45)

(l) If $\frac{6}{x + 5} = 75\ \%$, then x = ········ (El-Dakahlia 2013)

(30 or 3 or 0.3 or 0.03)

(m) 30 % of a number equals ········ (Red Sea 2014)

(its third or its three tenths or its three fifths or its three sevenths)

(n) 25 % of 1 000 = 50 % of ········ (El-Kalyoubia 2017)

(2 000 or 1 500 or 1 250 or 500)

9 Compare between : 65 % of 44 and 44 % of 65

10 If the percentage of the number of girls in a class is 67 %
Find the percentage of the number of boys in this class.



11 If the percentage of the succeeded pupils in an exam in Arabic in sixth grade in a school is 85 % Calculate the percentage of failures , then write each of the percentage of succeeded pupils and failures in the form of a common fraction in its simplest form.





12 Magid bought a T-shirt , labelled on a small card on it (made of cotton and synthetic).
The percentage of the synthetic is 40 %
Calculate the percentage of cotton , then find the equivalent fraction to each percentage.



13 In a mathematics exam , Youssef got 18 marks of 20 marks.
Find the percentage of the marks he got.
(Port Said 2015)



14 In a school trip , 12 pupils of 35 pupils in a class have participated.
Find the percentage of the participants.

15 There are 750 pupils in a school , 15 pupils were absent one day.
Find the percentage of absentees on that day.



16 A basket contains 32 oranges and 18 apples.
Find the percentage of oranges in this basket.



17 An alloy is made of gold and copper , its weight is 70 gm. , the weight of copper in it is 7 gm.
Find the percentage of the pure gold in it.
(El-Sharkia 2015)

5
Lesson

18 Hassan ate 3 pieces of gateaux from a box containing 24 pieces of gateaux in a party of his birthday. And he distributed 6 pieces on his family.
Calculate the percentage of the number of pieces that Hassan ate and the percentage of the number of pieces eaten by his family.



19 The monthly salary of an employee is L.E. 2 860 , he saves L.E. 429
Find the percentage of his savings and also the percentage of his expenditure.



20 A primary school has 300 pupils in grade six. If 60 pupils of them failed. Find the percentage of succeeded pupils in this school. (Kafr El-Sheikh 2016)



21 The price of a kilogram of apples has increased from L.E. 8 to P.T. 920
What is the percentage of the increase ?



22 In a maths exam , Hatem got 80 % and Ziad got 45 marks out of 60 Which of them has got a better score ? What is the difference between their scores ?



23 In a national survey , a sample of 427 persons was studied , 224 persons said "Yes" and 154 said "No".
Calculate the percentage (approximated to one decimal place) of those who did not answer.



24 Wael bought a car for L.E. 60 000 , he paid 30 % of its price.
How much money did he pay ?



25 In a train carriage , the number of occupied seats is 48 seats. If the total number of seats of the carriage is 60 seats , calculate :
(a) The percentage of the occupied seats.
(b) The percentage of the non-occupied seats.



26 A preparatory school has 1 050 pupils.
There are 420 pupils in the 1st grade , 350 pupils in the 2nd grade and the rest in the 3rd grade.
Find the percentage of pupils of each grade.



27 A factory for ready-made clothes has 450 workers , the owner of the factory decided to increase the number of workers.
90 workers in the first year and 45 workers in the second year. Calculate :



(a) The percentage of the increase in the first year.
(b) The percentage of the increase in the second year.

5
Lesson

28 A road of 520 km. long was paved in 3 months. If 45 % of it was paved in the first month and 25 % of it was paved in the second month. Find how many kilometres were paved in the third month.



29 650 pupils were tested in an examination , 86 % of them succeeded. Find the number of pupils who failed in this examination.



30 If the percentage of success in grade six in a primary school was 91 % and the number of pupils who failed was 18 pupils , how many pupils had succeeded ?



31 A family pays 35 % of its monthly income for housing and clothing , 50 % for eating and saves the rest. Find how much money this family saves monthly if its monthly income is L.E. 840



32 The owner of a bookshop sold 25 % of notebooks and the remainder was 60 notebooks. How many notebooks were there first ? (El-Dakahlia 2017)

33 A vase contains flowers , 30 % of them are pink , 45 % are jasmine and the rest are violet. If the vase contains 18 pink flowers , then how many jasmine and violet flowers does it contain ?



34 If 13 % of the sum of two amounts of money is L.E. 117 and the ratio between the two amounts is 2 : 3 Find each of the two amounts.



For Excellent Pupils



35 A runner covered 25 % of the track in 10 minutes. If he continued in the same rate. Find the total time needed in minutes to cover all the track. (Damietta 2015)



36 If the percentage of success of a school is 85 % and the total number of the students in this school is 800 students. If the ratio between the number of succeeded boys and the number of succeeded girls equals 2 : 3 Find the number of succeeded girls in this school. (Assiut 2013)





Lesson 6

Applications on the percentage

Prelude



- If a merchant bought some goods for L.E. 572 , then L.E. 572 is called **"The cost price = C.P."**

  i.e. The cost price is the amount of money that the merchant paid.

- If the merchant sold these goods for L.E. 890 , then L.E. 890 is called **"The selling price = S.P."**

  i.e. The selling price is the amount of money that he sold the goods.

- In this case , the merchant will make a **profit.**

> Profit = selling price (S.P.) – cost price (C.P.)
>
> **And**
>
> The percentage of profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$

- If he sells the goods for L.E. 463 , he will make a **loss.**

> Loss = cost price (C.P.) – selling price (S.P.)
>
> **And**
>
> The percentage of loss = $\frac{\text{Loss}}{\text{C.P.}} \times 100\ \%$

Notice that :

The cost price = buying price + expenditures (where expenditures may be maintenance , transportation , insurance , rentals , ... etc.)

Remarks

[1] When we say that the **profit** is 20 % , we mean that :
If the cost price (C.P.) = L.E. 100 , then the profit = L.E. 20 and the selling price (S.P.) = L.E. 120

[2] When we say that the **loss** is 15 % , we mean that :
If the cost price (C.P.) = L.E. 100 , then the loss = L.E. 15 and the selling price (S.P.) = L.E. 85

[3] When we say that the **interest** is 8 % , we mean that :
If we deposit L.E. 100 in a bank , then the interest = L.E. 8 and the amount of this money after one year = L.E. 108

[4] When we say that the **discount** is 25 % , we mean that :
If the price before the discount (The marked price) is L.E. 100 , then the discount = L.E. 25 and the price after the discount (The discount price) is L.E. 75

Example 1

A shopkeeper bought a TV set for L.E. 1 440 and sold it for L.E. 1 800 Find his profit and the percentage of it.



Solution

Profit = S.P. – C.P. = 1 800 – 1 440 = L.E. 360

Percentage of profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \% = \frac{360}{1\,440} \times 100\ \% = 25\ \%$

Another solution

C.P.	Profit	S.P.
100 %	?	
1 440	360	1 800

Percentage of profit = $\frac{360 \times 100\ \%}{1\,440} = 25\ \%$

Example 2

Medhat bought a car for L.E. 35 500 and sold it for L.E. 31 240

Find the percentage of loss.



Solution

Loss = C.P. – S.P. = 35 500 – 31 240

= L.E. 4 260

Percentage of loss = $\frac{\text{Loss}}{\text{C.P.}} \times 100\ \%$

$= \frac{4\,260}{35\,500} \times 100\ \% = 12\ \%$

Another solution

Percentage of loss = $\frac{4\,260 \times 100\ \%}{35\,500} = 12\ \%$

C.P.	Loss	S.P.
100 %	?	
35 500	4 260	31 240

Example 3

The selling price of some goods was L.E. 1 475 , if the merchant sold it at a profit of 18 % , then find :

[a] The cost price.

[b] The profit.

Solution

[a] The C.P. = $\frac{1\,475 \times 100\ \%}{118\ \%}$ = L.E. 1 250

[b] The profit = $\frac{1\,475 \times 18\ \%}{118\ \%}$ = L.E. 225

(or the profit = 1 475 – 1 250 = L.E. 225)

C.P.	Profit	S.P.
100 %	18 %	118 %
?	?	1 475

Example 4

A sheep merchant bought a ram for L.E. 436 and he spent L.E. 64 on feeding it. If he sold the ram at a profit of 12.5 % , then find its selling price.



Solution

The cost price = 436 + 64 = L.E. 500

The S.P. = $\frac{500 \times 112.5\ \%}{100\ \%}$ = L.E. 562.5

C.P.	:	Profit	:	S.P.
100 %	:	12.5 %	:	112.5 %
500	:		:	?

Example 5

A man bought a washing machine for L.E. 4 600 and spent L.E. 400 to repair it. He sold it with loss of 16 % of the cost price. Find the selling price and his loss in L.E.



Solution

The cost price = 4 600 + 400 = L.E. 5 000

The selling price = $\frac{84\ \% \times 5\,000}{100\ \%}$ = L.E. 4 200

The loss = 5 000 – 4 200 = L.E. 800

C.P.	:	Loss	:	S.P.
100 %	:	16 %	:	84 %
5 000	:	?	:	?

Another solution

The loss = $\frac{16\ \% \times 5\,000}{100\ \%}$ = L.E. 800

Try by yourself

A trader sold goods for L.E. 5 350 with 7 % profit.
Find the cost price of the goods.

6 Lesson

Example 6

A man bought a TV set. He was given a 5 % discount of its marked price which was L.E. 850 Find its discount price.



Solution

Price before discount : Discount : Price after discount

Price before discount	Discount	Price after discount
100 %	5 %	95 %
850		?

The discount price = $\frac{850 \times 95\ \%}{100\ \%}$ = L.E. 807.5

Try by yourself

If the cost price of a fridge before a discount of 12 % is L.E. 1 350 What is its price after discount ? and what is the amount of the discount ?

Example 7

Mariam deposited L.E. 3 000 in a bank with an interest of 10.5 % yearly. Find the total amount that Mariam got at the end of the year.



Solution

Before interest	Interest	After interest
100 %	10.5 %	110.5%
3 000		?

The total amount = $\frac{110.5\ \% \times 3\,000}{100\ \%}$ = L.E. 3 315

Exercise 11 Applications on the percentage


Solve Exercise

From the school book

1 A man bought a flat for L.E. 100 000 , after three years , he sold it for L.E. 130 000
Find the percentage of his profit. (Cairo 2016)

2 A merchant bought goods for L.E. 2 000 and he sold it for L.E. 1 800
Find the percentage of his loss. (Giza 2012)

3 A fruit seller bought an amount of oranges for L.E. 720 , after offering it for selling he found a part of it became bad.
Then he sold the remainder for L.E. 630
Find the percentage of his loss. (Beni Suef 2013)



4 A shopkeeper bought some goods for L.E. 4 500
He spent L.E. 500 to transport them. He sold these goods for L.E. 6 250
Find the percentage of his profit.

5 Maher bought a car for L.E. 49 000 and he spent L.E. 1 000 for repairing it , then he sold it for L.E. 55 000
Calculate the percentage of his profit. (El-Monofia 2017)



6 A shopkeeper for electric sets sold a refrigerator for L.E. 3 180
If the percentage of his profit is 6 %
Find the buying price. (Damietta 2016)



6
Lesson

7 A company for selling the electric sets.
It sells a TV set for L.E. 2 100
If the percentage of the profit of this company is 12 % Find the buying price of the TV
(El-Sharkia 2014)



8 A man sold his air conditioner for L.E. 10 800
He lost 10 % , find the amount of his loss.



9 Find the buying price of goods sold for L.E. 21 520 and the percentage of profit is 15 % and find the profit. (Alexandria 2017)

10 Khaled bought a flat for L.E. 150 000
After selling it , he found that the percentage of his loss was 5 %
Calculate the selling price of the flat.
(Beni Suef 2015)



11 A man bought a boat for L.E. 5 480 and spent L.E. 1 020 to repair it.
When selling it , he lost 6 % , find its selling price.



12 If the percentage of profit of a TV set in a shop is 12.5 % , then find each of the cost price and the selling price knowing that the profit of the shop is L.E. 105



13 A man sold a satellite dish with a profit of L.E. 1 800 , if his percentage of profit is 22.5 %
Find the selling price of this dish.



14 A merchant sold a car with a loss of L.E. 562.5 , if his percentage of loss was 4.5 %, then find the buying price of this car.

15 The marked price of a television set is L.E. 2 500 , it has been sold for L.E. 2 350
Find the percentage of the discount.



16 A discount 20 % was made for the price of a book , its price became L.E.12
What was its price before the discount ?
(Ismailia 2013)



17 📖 Nahed bought an automatic washing machine for L.E. 3 600 and the discount was 10 %
Calculate the original price of the washing machine before discount. (El-Menia 2014)



18 The price of a mobile phone before a discount is L.E. 240
If the discount is 20 %
What is its price after the discount ?
(Alexandria 2015)



6 Lesson

19 A piece of cloth of 20 metres long , was put in water, it shrunk by 4 %

What is the length after shrinking ?



20 If a man deposited L.E. 20 000 in a bank with annual interest 8 %

Find the total amount which he gets at the end of one year. (Alexandria 2016)



21 The production cost of an 8 feet fridge is L.E. 900

A 10 % production tax is added to the cost.

What is the total cost of the fridge ?



22 **Complete the following table :**

	Original price	Percentage of the discount	Discount	Price after the discount
(a)	3 000	....	....	2 640
(b) 📖	....	....	32	192
(c)	450	....	45	....
(d) 📖	560	10 %	....	....
(e) 📖	....	15 %	65	....
(f)	....	5 %	....	2 850

23 Complete the following table :

	Item	Cost price	Selling price	Profit	Percentage of the profit
(a)	TV	1 800	2 000	....	....
(b)	Computer	4 800	....	1 000	....
(c)	Refrigerator	2 400	....	....	12 %
(d)	Washing machine	....	3 100	175	....
(e)	Video	....	....	600	15 %

24 Complete the following table :

	Cost price	Selling price	Loss	Percentage of loss
(a)	7 200	6 600	....	....
(b)	5 400	....	....	12 %
(c)	9 600	....	800	....
(d)	....	9 000	....	10 %

25 The discount percentage in a shop is 10 %
If Hend wanted to buy a blouse, its price before the discount is L.E. 130 and a dress, its price before the discount is L.E. 250
How much will she pay after discount ?
(Beni Suef 2011)



26 If you have L.E. 125 , and want to buy a T-shirt , you found two offers, the first offer is a T-shirt of L.E. 160 with discount 20 % and the second offer is a T-shirt of L.E. 140 with discount 15 %
Which is the better offer for buying this T-shirt ?





27 In one of commercial shops, the milk box is sold for L.E. 5 , if you bought two boxes , you will got a discount of 15 % for each two boxes. Calculate the buying price of 6 boxes of milk. Is the saved money enough to buy any boxes of milk ?



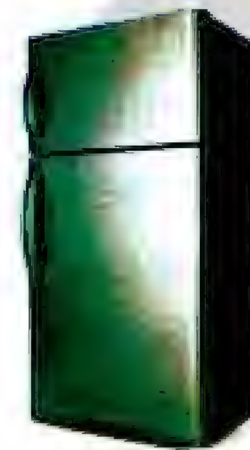
28 A man bought a house for L.E. 75 000 and a farm for L.E. 100 000 He sold the house with a loss of 15 % and the farm with a profit of 25 %
Find the net profit or loss of this man.



29 A man bought a house and spent L.E. 22 400 to repair it.
He sold it for L.E. 92 000 , if his percentage of profit is 15 %
Find the buying price of the house.



30 A merchant bought some goods for L.E. 20 000 and stored them. Then he sold these goods with a profit of 6 % of the buying price and the storing expenses.
If he sold the goods for L.E. 21 624
Calculate the storing expenses.



31 A merchant sells a fridge for L.E. 5 000
When nobody came to buy it , he gave a discount of 4 % on the registered price.
This way he sold it by a profit of 20 %
Find the cost price of this fridge.



32 A bicycle seller found that if he sells a bicycle for L.E. 1 656 , his loss will be 8 % Find the cost price of the bicycle and find the selling price that makes him get a profit of 12 %



33 A merchant bought a car for L.E. 50 000 , then he sold it with a loss of 10 % , and he bought another car for L.E. 75 500 and sold it with a profit of 8 % Determine if the result of the two previous deals is a profit or a loss , then find the value of the profit or the loss.

34 If the price of an electric guitar set is 2 000 pounds , it has been reduced by 20 % , then calculate the percentage at which the new price must be increased up to get the original price.



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35 A merchant bought 35 metres of wool for L.E. 40 each and sold 80 % of it with a profit of 20 % and sold the remainder in sale with a loss of 24 % Find the total selling price, did the merchant gain or lose ? and find the percentage of loss or profit.



Test on Unit Two

Answer the following questions :

1 Choose the correct answer :

(a) If $\frac{3}{5} = \frac{x}{20}$, then $x =$ .... (6 or 8 or 10 or 12)

(b) If the length of Suez Canal on a map of drawing scale 1 : 1 100 000 is 15 cm. , then its real length in km. equals ....

(155 or 165 or 170 or 185)

(c) 10 % + $\frac{9}{20}$ = ... % (35 or 45 or 55 or 65)

(d) A car consumes 12 litres of fuel to cover a distance of 96 km. How many litres are needed to cover a distance of 144 km. ?

(10 or 16 or 18 or 20)

(e) If $\frac{x}{9}$ = 15 % , then $x =$ .... (60 or 20 or 1.35 or 15)

2 Complete each of the following :

(a) 1 – (37 % + 41 %) = ...

(b) 12 % of 108 $\frac{1}{3}$ kg. = ... kg.

(c) If the length in a drawing is 2 cm. and the real length is 6 metres , then the drawing scale = ... : ....

(d) If $\frac{x + 8}{6} = 2$, then $x =$ ....

(e) If the drawing scale < 1 , this expresses ....

3

(a) 3 700 pupils were tested in an examination , 85 % of them succeeded. Find the number of pupils who failed in this examination.

(b) Ahmed bought a refrigerator in the time of occasion with price L.E. 4 275 after discount equals 5 % , find the price of the refrigerator before discount.

---

4 **(a)** A lense was used to enlarge an insect of real length 0.4 mm. and its length after enlargement is 4.8 cm. Calculate the ratio of enlargement.

(b) A fruit seller bought an amount of mango of the price L.E. 7 600 , then after offering it for selling he found a part of it became bad , then he sold the remainder in the price L.E. 6 080
Find the percentage of his loss.

---

5 **(a)** The height of a minaret is 85 metres and the length of its shade in a moment equals 34 m. What is the height of a tree in front of this minaret if the length of its shade equals 17 metres in the same moment ?

(b) A man distributed 6 300 pounds among his three sons , if the share of the first was third of the money and the ratio between the share of the second and the third equals 3 : 2
Calculate the share of each of them.

Geometry and measurement

UNIT THREE

Lessons of the unit :

1. Relations between the geometrical shapes.
2. Visual patterns.
3. Volumes.
4. Volume of the cuboid.
5. Volume of the cube.
6. Capacity.

⊙ **Unit test.**



Lesson 1

Relations between the geometrical shapes

The parallelogram and its special cases

First The parallelogram

Definition

The parallelogram is a quadrilateral in which each two opposite sides are parallel.

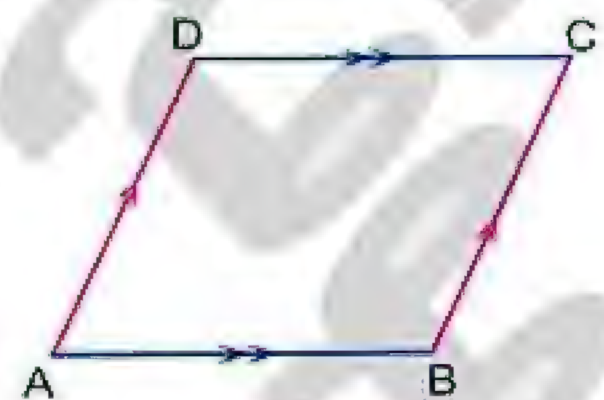
For example :

In the opposite figure :

If ABCD is a quadrilateral

in which : $\overline{AB} // \overline{DC}$ and $\overline{AD} // \overline{BC}$,

then ABCD is a parallelogram

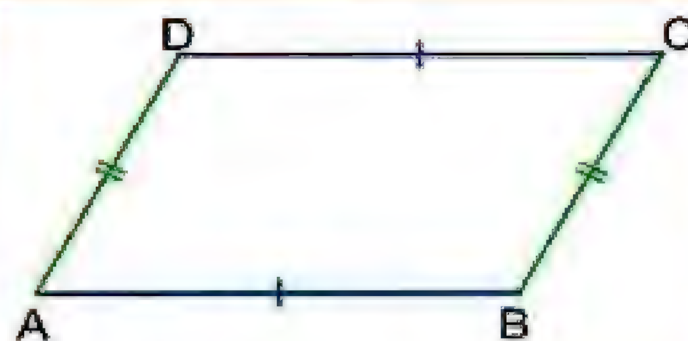
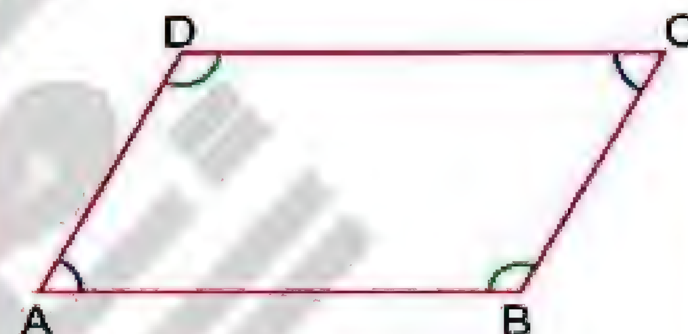
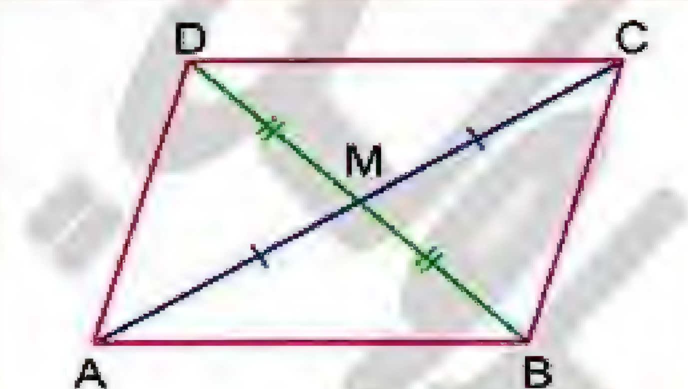


Properties of the parallelogram

If it is given that ABCD is a parallelogram , then you can use one of the following properties :



1
Lesson

1. Each two opposite sides are equal in length.		• AB = CD • BC = DA
2. Each two opposite angles are equal in measure.		• m (∠ A) = m (∠ C) • m (∠ B) = m (∠ D)
3. The sum of measures of each two consecutive angles is 180°		• m (∠ A) + m (∠ B) = 180° • m (∠ B) + m (∠ C) = 180° • m (∠ C) + m (∠ D) = 180° • m (∠ D) + m (∠ A) = 180°
4. The two diagonals bisect each other.		• CM = AM • BM = DM

Remark 1

The perimeter of the parallelogram = the sum of lengths of two consecutive sides × 2

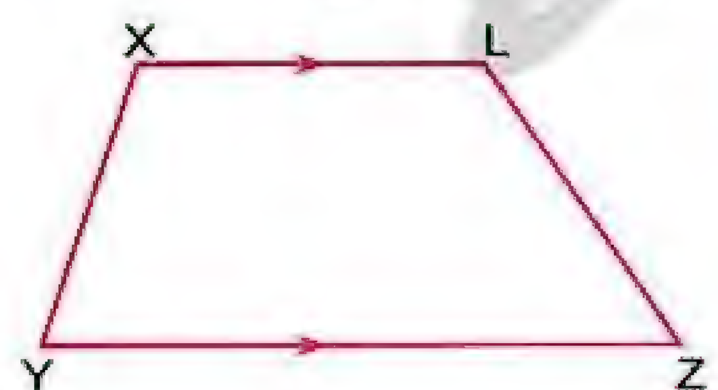
Remark 2

A quadrilateral in which there are only two sides are parallel is called a **trapezium** (or trapezoid).

For example :

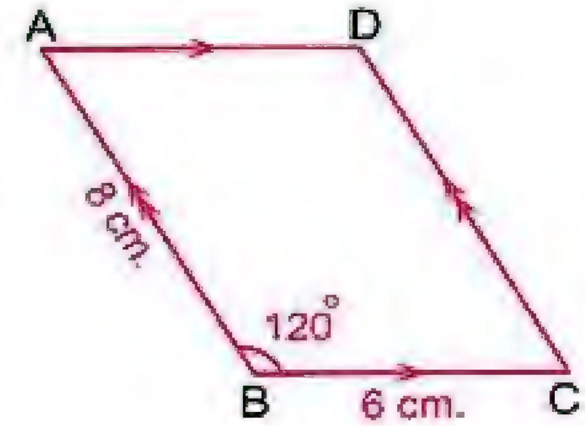
In the opposite figure :

If XYZL is a quadrilateral in which : $\overline{XL}$ // $\overline{YZ}$, then XYZL is a trapezium.



Example 1

In the opposite figure :



ABCD is a parallelogram in which :

AB = 8 cm. , BC = 6 cm. and m (∠ ABC) = 120°

Find without measuring :

[a] AD

[b] CD

[c] m (∠ C)

[d] m (∠ D)

[e] m (∠ A)

[f] The perimeter of the parallelogram ABCD

Solution

[a] AD = BC = 6 cm. (Two opposite sides in the parallelogram)

[b] CD = BA = 8 cm. (Two opposite sides in the parallelogram)

[c] m (∠ C) + m (∠ B) = 180° (Two consecutive angles in the parallelogram)
, then m (∠ C) = 180° – 120° = 60°

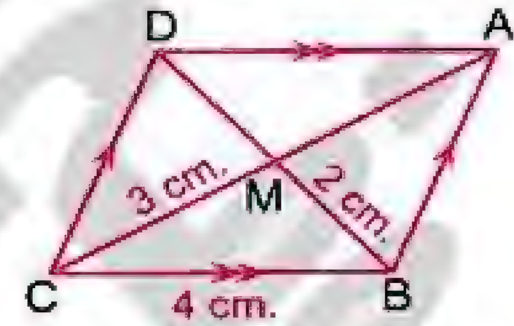
[d] m (∠ D) = m (∠ B) = 120° (Two opposite angles in the parallelogram)

[e] m (∠ A) = m (∠ C) = 60° (Two opposite angles in the parallelogram)

[f] The perimeter of ▱ ABCD = (AB + BC) × 2 = (8 + 6) × 2 = 14 × 2 = 28 cm.

Example 2

In the opposite figure :



ABCD is a parallelogram , $\overline{AC}$ and $\overline{BD}$ intersect at M

If BC = 4 cm. , BM = 2 cm. and MC = 3 cm.

Find the perimeter of Δ AMD

Solution

AM = MC = 3 cm. (M is the midpoint of the diagonal $\overline{AC}$)

DM = MB = 2 cm. (M is the midpoint of the diagonal $\overline{BD}$)

AD = CB = 4 cm. (Two opposite sides in the parallelogram)

Then , the perimeter of Δ AMD = AM + DM + AD = 3 + 2 + 4 = 9 cm.

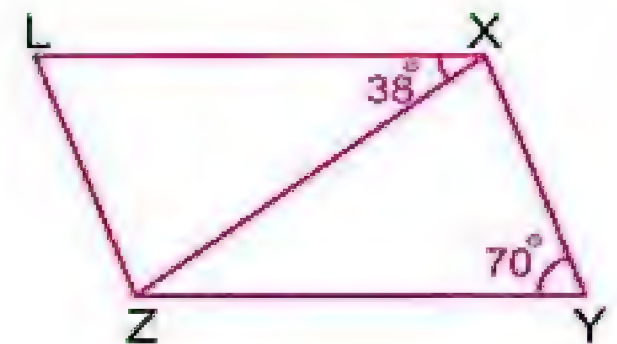
1 Lesson

Example 3

In the opposite figure :

XYZL is a parallelogram in which :

m (∠ Y) = 70° and m (∠ LXZ) = 38°



Find :

[a] m (∠ L)

[b] m (∠ YXZ)

Solution

[a] m (∠ L) = m (∠ Y) = 70° (Two opposite angles in the parallelogram)

[b] m (∠ LXY) + m (∠ Y) = 180°

(Two consecutive angles in the parallelogram)

, then m (∠ LXY) = 180° – 70° = 110°

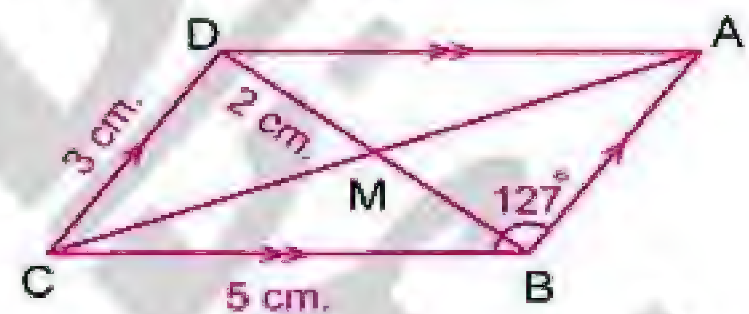
, then m (∠ YXZ) = 110° – 38° = 72°

Try by yourself

In the opposite figure :

ABCD is a parallelogram ,

$\overline{AC}$ and $\overline{BD}$ intersect at M



If BC = 5 cm. , DC = 3 cm. , DM = 2 cm.

and m (∠ ABC) = 127° ,

complete the following :

[a] AB = ... cm. and AD = ... cm.

[b] BD = ... cm.

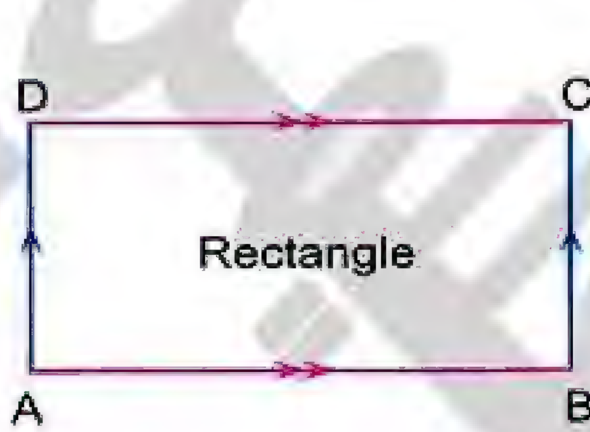
[c] m (∠ ADC) = ...° , m (∠ BAD) = ...°

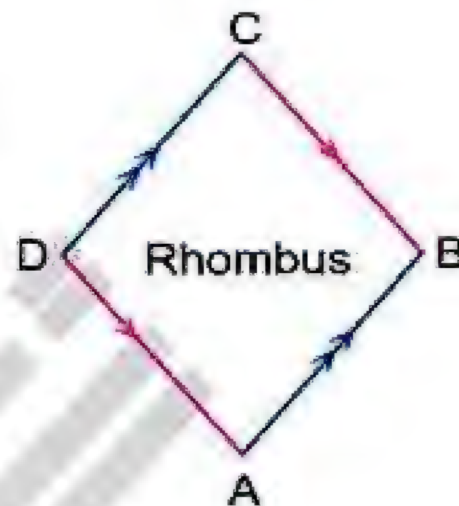
and m (∠ BCD) = ...°

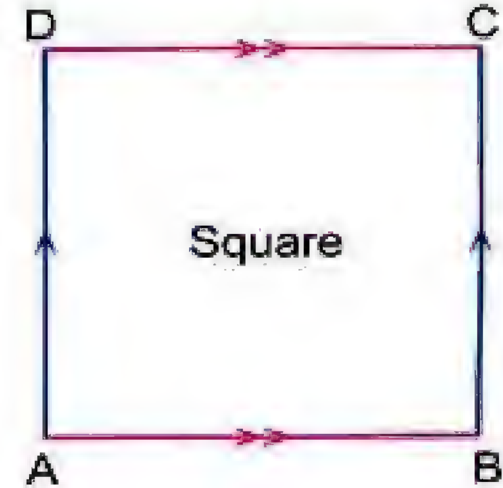
[d] The perimeter of ▱ ABCD = ... cm.

Second Special cases of the parallelogram

Each of rectangle, rhombus and square can be considered as a parallelogram because in each of them, each two opposite sides are parallel.





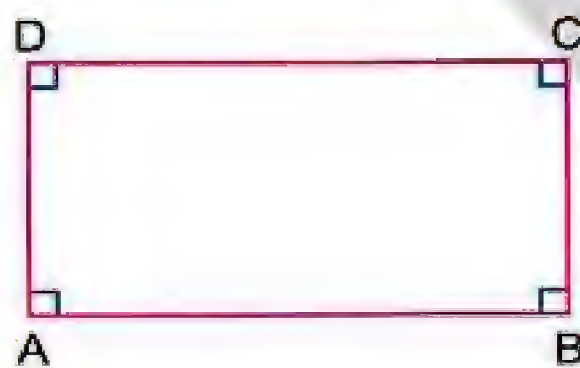
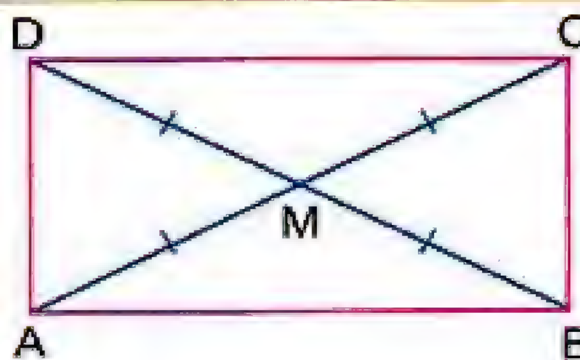


1 The rectangle

The rectangle is a parallelogram with a right angle.



Properties of the rectangle

The rectangle has the same properties of the parallelogram , in addition :		
1. The four angles of the rectangle are all equal in measure and the measure of each is 90°		m (∠ A) = m (∠ B) = m (∠ C) = m (∠ D) = 90° "right angles"
2. The two diagonals of the rectangle are equal in length.		AC = BD Then AM = CM = BM = DM

Remark 3

The perimeter of the rectangle = (length + width) × 2

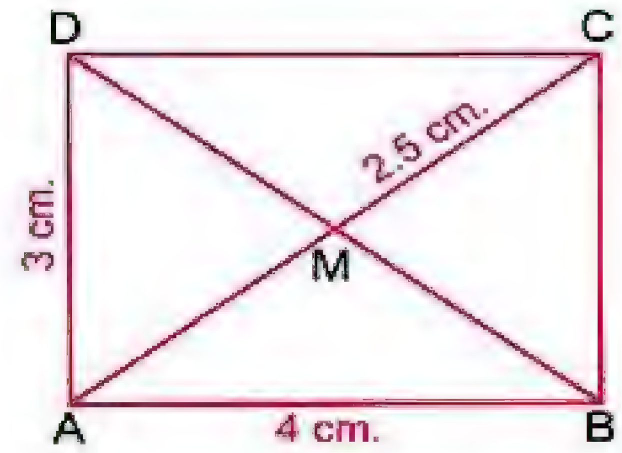
1 Lesson

Example 4

In the opposite figure :

ABCD is a rectangle in which :

AB = 4 cm. , AD = 3 cm. and MC = 2.5 cm.



Find without measuring :

[a] m (∠ ABC)

[b] AM

[c] BD

[d] The perimeter of the rectangle ABCD

Solution

[a] m (∠ ABC) = 90° (Properties of the rectangle)

[b] AM = CM = 2.5 cm. (M is the midpoint of the diagonal $\overline{AC}$)

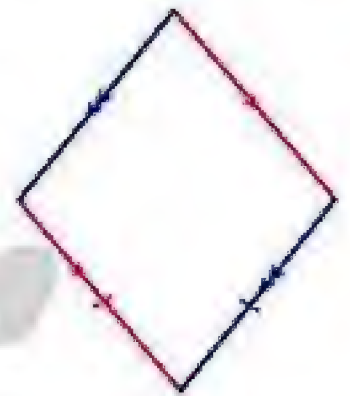
[c] BD = AC = 2.5 + 2.5 = 5 cm. (Two diagonals of the rectangle)

[d] The perimeter of the rectangle ABCD = (AB + AD) × 2

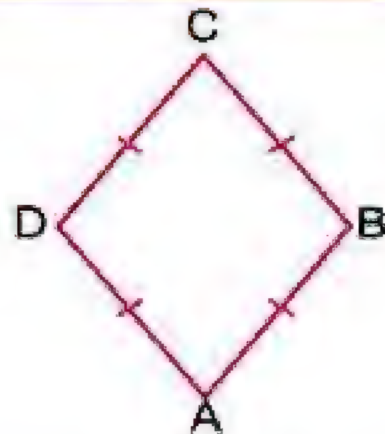
= (4 + 3) × 2 = 14 cm.

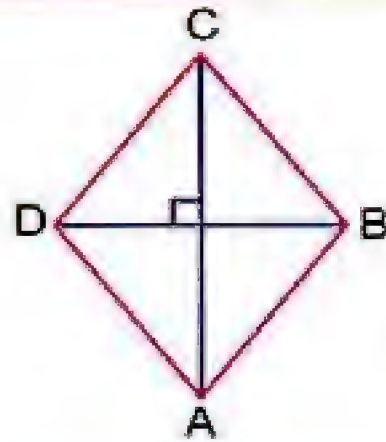
2 The rhombus

The rhombus is a parallelogram in which two adjacent sides are equal in length.



Properties of the rhombus

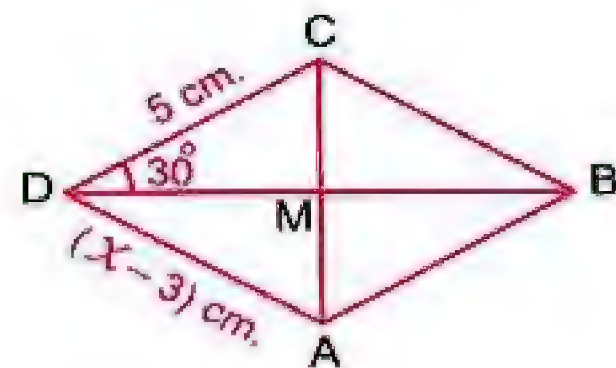
The rhombus has the same properties of the parallelogram, in addition :		
1. The four sides of the rhombus are equal in length.		AB = BC = CD = DA

2. The two diagonals of the rhombus are perpendicular.		$\overline{AC} \perp \overline{BD}$

Remark 4

The perimeter of the rhombus = the length of its side × 4

Example 5



In the opposite figure :

ABCD is a rhombus in which :

DC = 5 cm. , DA = (x – 3) cm. and

m (∠ BDC) = 30°

Using the properties of the rhombus , find :

[a] The value of x [b] m (∠ MCD)

[c] The perimeter of the rhombus ABCD

Solution

[a] AD = DC (Two sides in the rhombus)

So, $x - 3 = 5$, then $x = 5 + 3 = 8$ cm.

[b] m (∠ CMD) = 90° (Two diagonals of the rhombus are perpendicular)

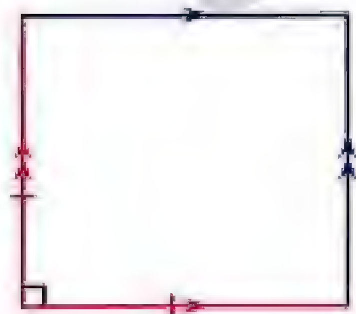
, then in Δ CMD , m (∠ MCD) = 180° – (30° + 90°) = 60°

[c] The perimeter of the rhombus ABCD = the length of its side × 4

= 5 × 4 = 20 cm.

3 The square

The square is a parallelogram with a right angle and two adjacent sides are equal in length.



1
Lesson

Properties of the square

The square has the same properties of the parallelogram, in addition :		
1. The four sides of the square are equal in length.	(square ABCD)	AB = BC = CD = DA
2. The four angles of the square are equal in measure and the measure of each is 90°	(square ABCD with right angles)	m (∠ A) = m (∠ B) = m (∠ C) = m (∠ D) = 90° "right angles"
3. The two diagonals of the square are equal in length and perpendicular.	(square ABCD with diagonals meeting at M)	• AC = BD Then AM = CM = BM = DM • $\overline{AC} \perp \overline{BD}$

Remark 5

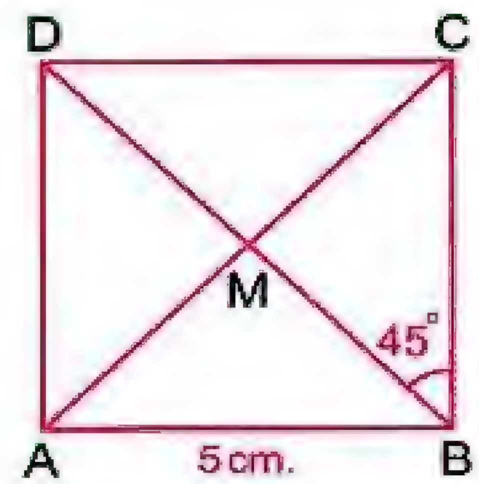
The perimeter of the square = the length of its side × 4

Notice that :

We can also define the square as follows :

(1) A square is a rectangle with two adjacent sides equal in length.
(2) A square is a rectangle with two perpendicular diagonals.
(3) A square is a rhombus with a right angle.
(4) A square is a rhombus with two diagnals equal in length.

Example 6



In the opposite figure :

ABCD is a square in which AB = 5 cm.

and m (∠ CBD) = 45°

Find without measuring :

[a] AD [b] m (∠ DBA) [c] m (∠ BCM)

[d] The perimeter of the square ABCD

Solution

[a] AD = AB = 5 cm. (Two sides in the square)

[b] m (∠ CBA) = 90° (Property of the square) , then m (∠ DBA) = 90° – 45° = 45°

[c] m (∠ CMB) = 90° (The two diagonals in the square are perpendicular)

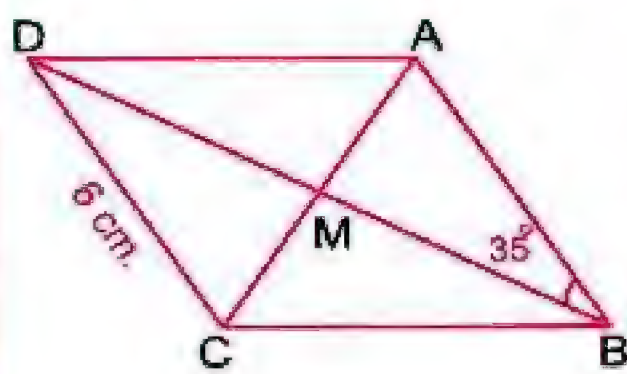
In Δ CMB : m (∠ BCM) = 180° – (90° + 45°) = 45°

[d] The perimeter of the square ABCD = 4 × the length of its side

= 4 × 5 = 20 cm.

Try by yourself

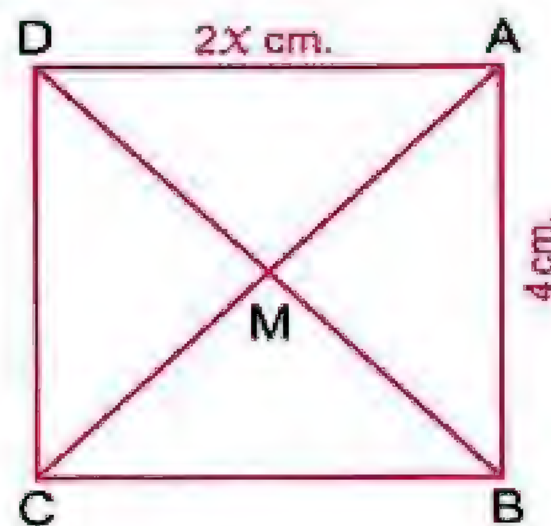
Using each figure, complete :



• ABCD is a rhombus :

• AD = ... cm.

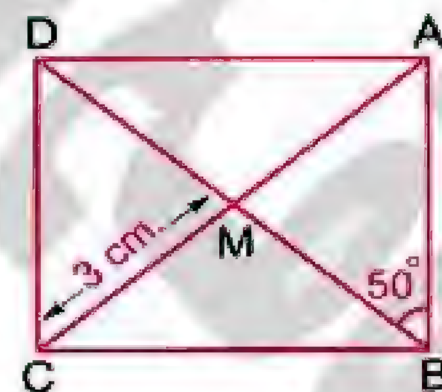
• m (∠ BAM) = ...°



• ABCD is a square :

• x = ...

• m (∠ AMB) = ...°



• ABCD is a rectangle :

• BD = ... cm.

• m (∠ DBC) = ...°



SUMMARY

A parallelogram is

a rectangle

If :
- One of its angles is right.

or

- Its two diagonals are equal in length.

a rhombus

If :
- Two adjacent sides are equal in length.

or

- Its two diagonals are perpendicular.

a square

If :
- One of its angles is right and two adjacent sides are equal in length.

or

- One of its angles is right and its diagonals are perpendicular.

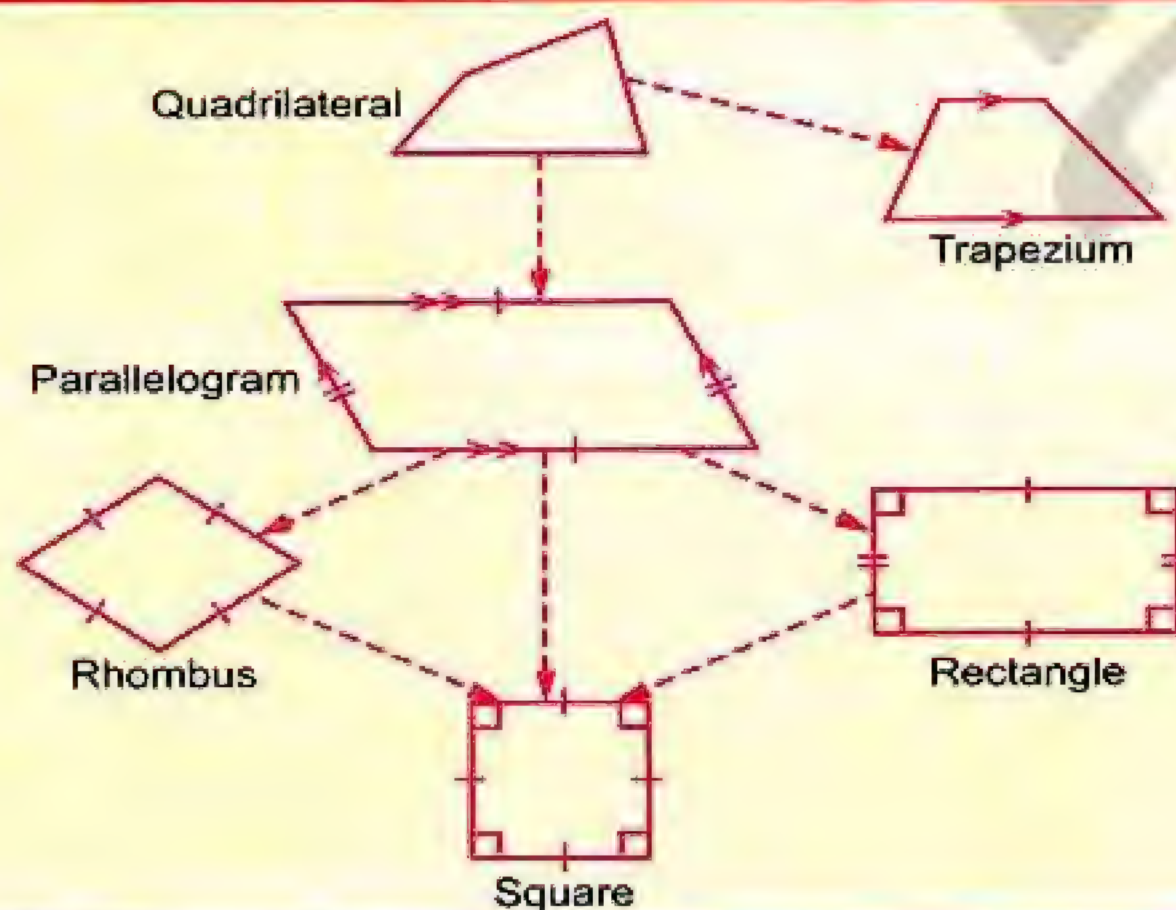
or

- The two diagonals are equal in length and perpendicular.

or

- Two adjacent sides are equal in length and its diagonals are equal in length.

The following figure shows the relations among quadrilaterals :



Exercise 12 Relations between the geometrical shapes



From the school book

1 Complete the following due to what you have studied about the properties of geometrical shapes :

(a) The four sides are equal in length in each of .... and ....
(South Sinai 2015)

(b) The two diagonals are equal in length in each of .... and ....
(El-Dakahlia 2013 , Giza 2017)

(c) The two diagonals are perpendicular in each of .... and ....
(El-Menia 2017 , Luxor 2014)

(d) The four angles are right in each of .... and .... (El-Sharkia 2011)

(e) The opposite angles are equal in measure in each of .... , ... , ... and ....

(f) The two diagonals bisect each other in each of .... , ... , ... and ....

(g) The sum of measures of the two consecutive angles equals 180° in each of .... , ... , ... and ....

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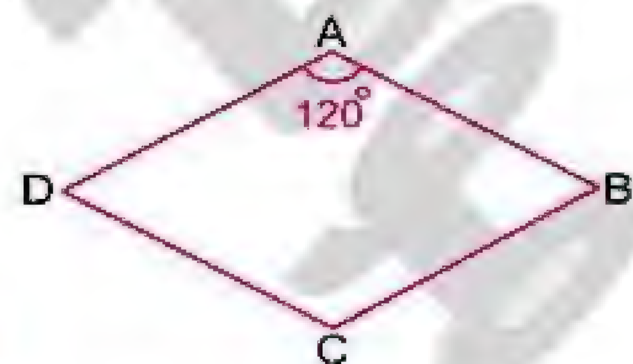
2 Complete the following :

(a) The parallelogram is a quadrilateral in which its two diagonals ....
(El-Fayoum 2014)

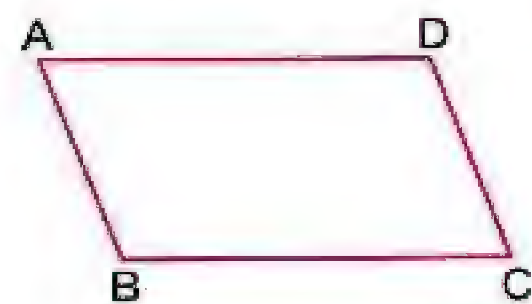
(b) In the parallelogram , the sum of measures of any two consecutive angles = ...°
(El-Sharkia 2016)

(c) In the parallelogram , each two opposite sides are .... and ....

(d) **In the opposite figure :**
ABCD is a rhombus
in which : m (∠ A) = 120°
, then m (∠ B) = ...° (El-Monofia 2017)



(e) **In the opposite figure :**
ABCD is a parallelogram in which :
m (∠ A) + m (∠ C) = 140° , then
m (∠ B) = ...°



(f) A parallelogram is a rhombus when its two diagonals are ....
(Ismailia 2011)

(g) The rectangle is a parallelogram in which .... (Qena 2016)

(h) The rhombus whose one of its angles is right is called ....

(i) The rhombus is a square if .... are equal in length. (Damietta 2011)

(j) If one of the angles of a parallelogram is right , then it is called .... (Port Said 2015)

(k) If one of the angles of the parallelogram is right and two of its adjacent sides are equal in length , then it is called .... (Alexandria 2017)

3 Choose the correct answer from the given ones :

(a) The two diagonals are perpendicular and equal in length in the ....
(El-Kalyoubia 2011)
(rectangle *or* square *or* parallelogram *or* rhombus)

(b) The two diagonals of the rectangle are ....
(perpendicular *or* equal in length *or* perpendicular and equal in length *or* parallel)

(c) The two diagonals of the square are ....
(just perpendicular *or* just equal in length *or* perpendicular and equal in length *or* not equal in length and not perpendicular)

(d) If one angle in a parallelogram is right , then it is called ....
(Giza 2016) (rhombus *or* trapezium *or* triangle *or* rectangle)

(e) The two diagonals are perpendicular and not equal in length in the ....
(El-Dakahlia 2015)
(parallelogram *or* rectangle *or* rhombus *or* square)

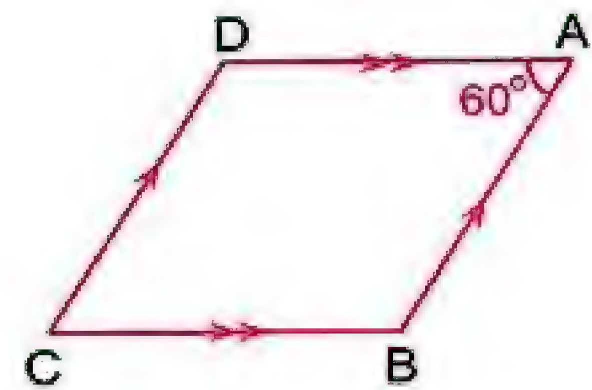
(f) The two diagonals are equal in length and not perpendicular in the ....
(Luxor 2015)
(parallelogram *or* rectangle *or* rhombus *or* square)

(g) The parallelogram in which two adjacent sides are equal in length is called ....
(a square *or* a rectangle *or* a trapezium *or* a rhombus)

(h) **In the opposite figure :**

ABCD is a parallelogram ,

m (∠ A) = 60° , then m (∠ B) = ………

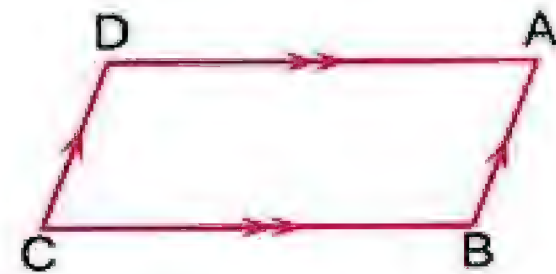


(South Sinai 2017) (30° or 60° or 90° or 120°)

(i) **In the opposite figure :**

ABCD is a parallelogram , then

m (∠ A) + m (∠ B) = ………



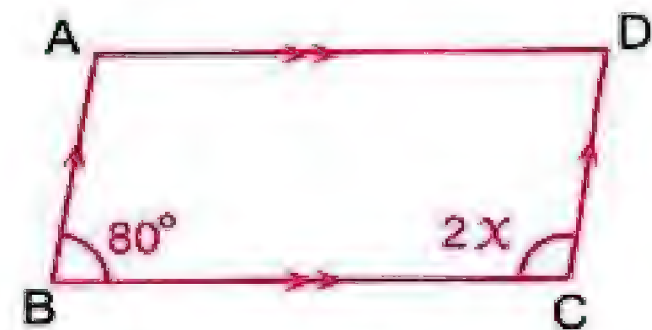
(Assiut 2012) (90° or 180° or 360° or 108°)

(j) **In the opposite figure :**

ABCD is a parallelogram in which :

m (∠ B) = 80°, m (∠ C) = 2 x , then

the value of x in degrees = ………



(Damietta 2015) (100 or 80 or 50 or 40)

(k) **In the opposite figure :**

The number of parallelograms

is ………

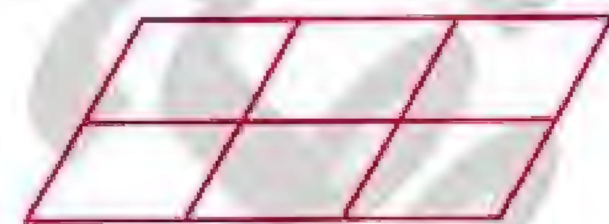


(Souhag 2017 , El-Gharbia 2016) (4 or 5 or 7 or 9)

(l) **In the opposite figure :**

The number of parallelograms

is ………



(6 or 9 or 12 or 18)

(m) **In the opposite figure :**

The number of trapezoids

is ………



(Alexandria 2016) (2 or 3 or 4 or 5)

1 Lesson

4 **In the opposite figure :**

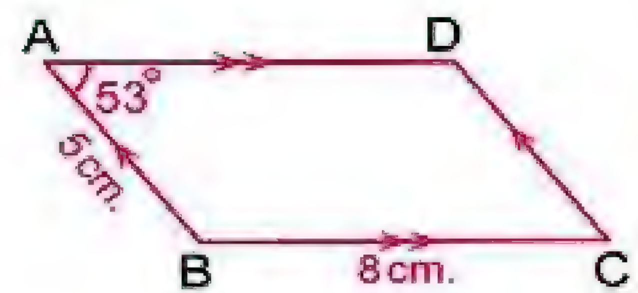
ABCD is a parallelogram in which :

AB = 5 cm. , BC = 8 cm. and m (∠ DAB) = 53°

Without using geometrical instruments ,

Find : (1) m (∠ ABC)

(2) The length of each of $\overline{AD}$ and $\overline{DC}$



5 **In the opposite figure :**

ABCD is a parallelogram in which :

m (∠ B) = 120° , BC = 4 cm. and AB = 2 cm.

Without using geometrical instruments :

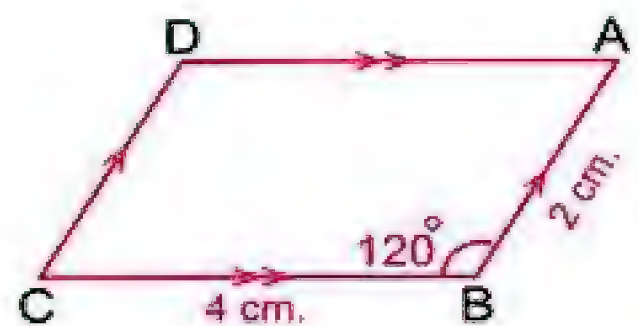
(1) Find :

(a) m (∠ D) (b) m (∠ A)

(2) Complete :

(a) $\overline{AD}$ // ....

(b) The perimeter of ABCD = ... cm. **(Beni Suef 2012)**



6 **In the opposite figure :**

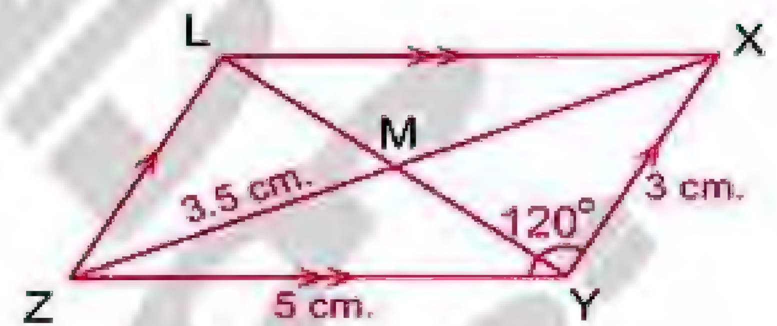
XYZL is a parallelogram in which :

m (∠ XYZ) = 120° , XY = 3 cm. ,

YZ = 5 cm. and ZM = 3.5 cm.

Find : (1) m (∠ XLZ)

(2) The perimeter of the triangle XLZ **(Cairo 2016)**



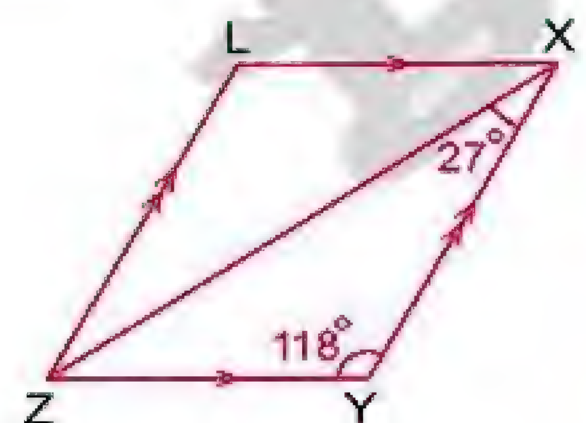
7 **In the opposite figure :**

XYZL is a parallelogram in which :

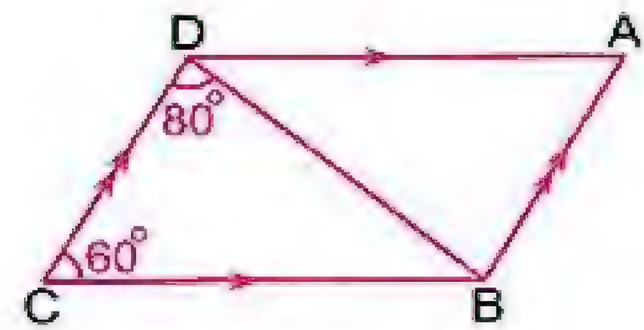
m (∠ Y) = 118° and m (∠ YXZ) = 27°

Find : (1) m (∠ L)

(2) m (∠ LXZ)



8 In the opposite figure :



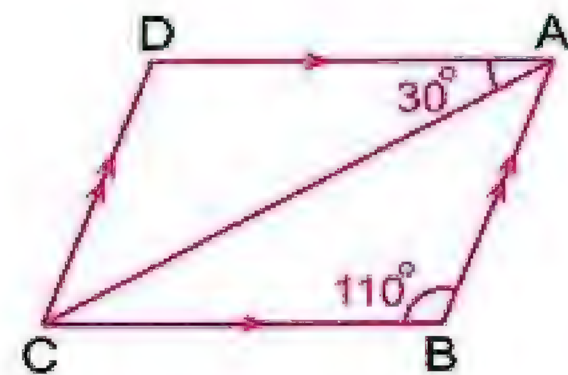
ABCD is a parallelogram in which :

m (∠ C) = 60° and m (∠ BDC) = 80°

Find : (1) m (∠ A)

(2) m (∠ ADB) (Ismailia 2015)

9 The opposite figure shows a parallelogram :



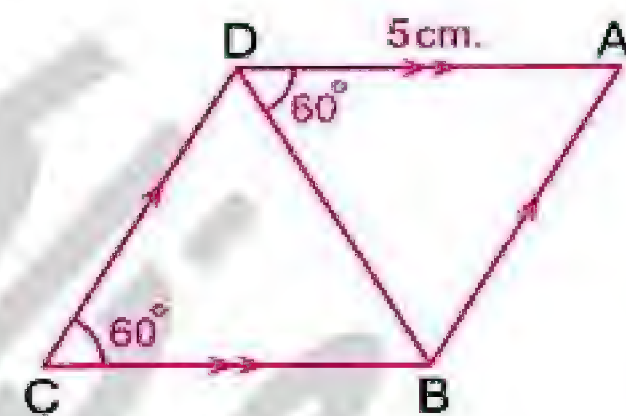
in which : m (∠ B) = 110° and m (∠ DAC) = 30°

Find : (1) m (∠ D)

(2) m (∠ BAC)

(3) m (∠ ACD) (Kafr El-Sheikh 2012)

10 In the opposite figure :



ABCD is a parallelogram in which :

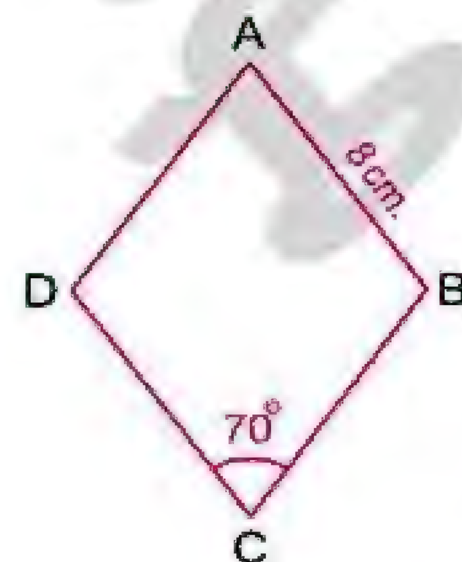
m (∠ C) = 60° , m (∠ ADB) = 60° and AD = 5 cm.

Find : (1) m (∠ A) and m (∠ ABD)

(2) The type of the triangle ABD according to its sides.

(3) The perimeter of the shape ABCD (Cairo 2013)

11 In the opposite figure :



ABCD is a rhombus in which :

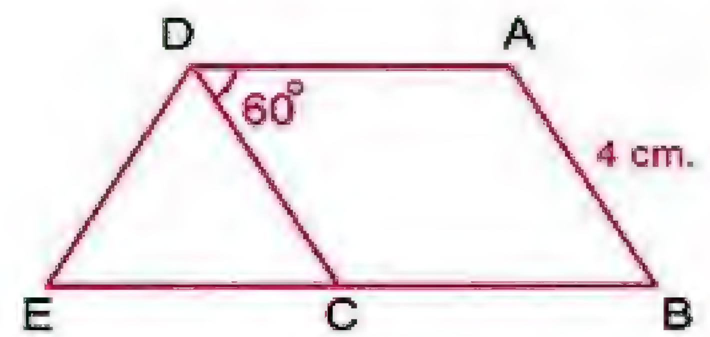
m (∠ BCD) = 70° and the length of $\overline{AB}$ = 8 cm.

Find : (1) The perimeter of the figure ABCD

(2) m (∠ ABC) (Kafr El-Sheikh 2014)

1
Lesson

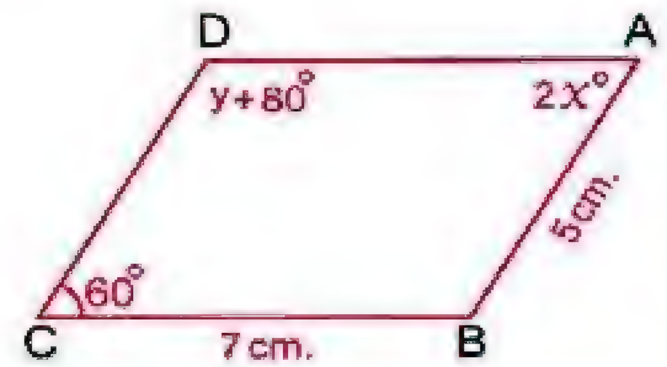
12 In the opposite figure :



ABCD is a rhombus , m (∠ ADC) = 60° ,
AB = 4 cm. and Δ DCE is equilateral.

Find : **(1)** m (∠ B) **(2)** m (∠ A)
(3) The length of $\overline{BE}$
(4) The perimeter of the trapezium ABED (Ismailia 2016)

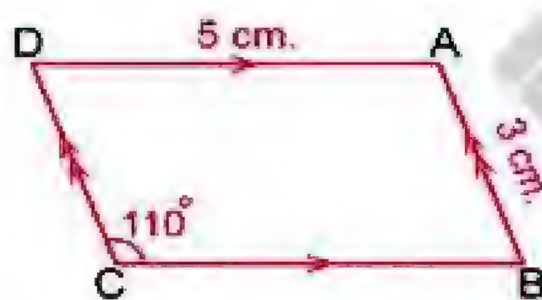
13 In the opposite figure :



ABCD is a parallelogram having
AB = 5 cm. , BC = 7 cm. and m (∠ C) = 60°
Calculate : **(1)** The value of each of x and y
(2) The perimeter of the parallelogram ABCD (El-Dakahlia 2014)

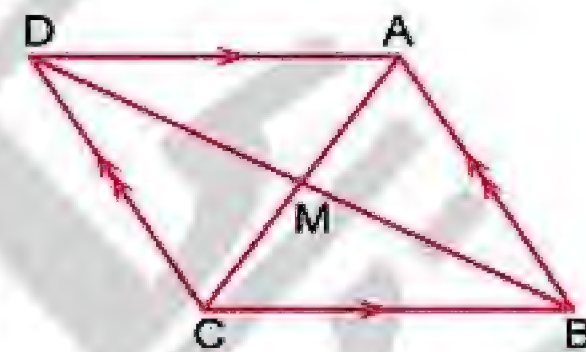
14 Complete the following using the given data of each figure :

(a)



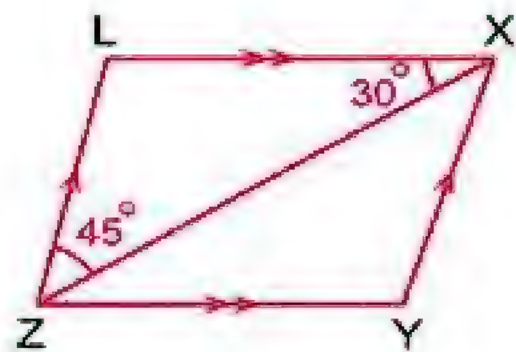
• BC = ... cm.
• CD = ... cm.
• m (∠ A) = ...°
• m (∠ D) = ...°

(b) AC = 8 cm. and BM = 7 cm.



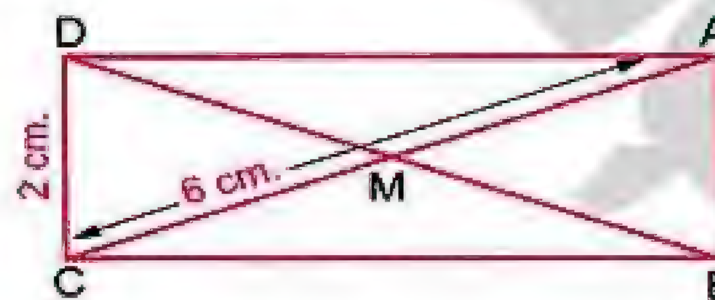
• AM = ... cm.
• BD = ... cm.

(c)



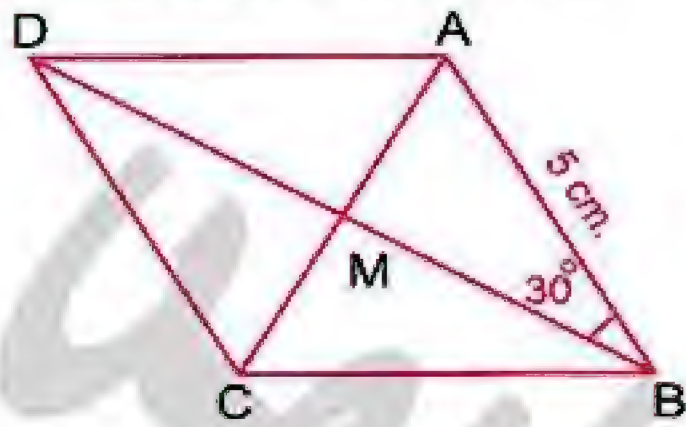
• m (∠ Y) = ...°

(d) ABCD is a rectangle :



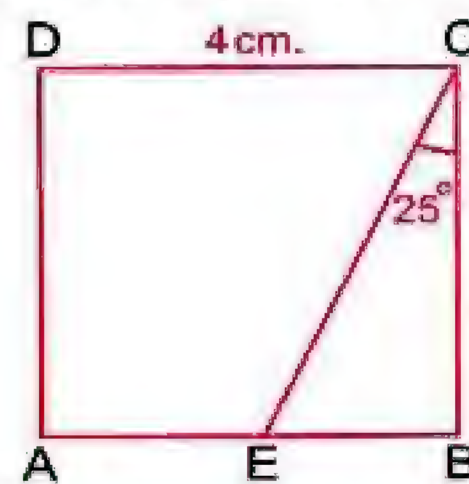
• AB = ... cm.
• DM = ... cm.
• The perimeter of Δ ABM = ... cm.

(e) ABCD is a rhombus :



- AD = ... cm.
- m (∠ BAM) = ... °

(f) ABCD is a square :



- The perimeter of the square ABCD = ... cm.
- m (∠ DCE) = ... °
- m (∠ CEB) = ... °

15 Find the value of x in each of the following figures :

A parallelogram

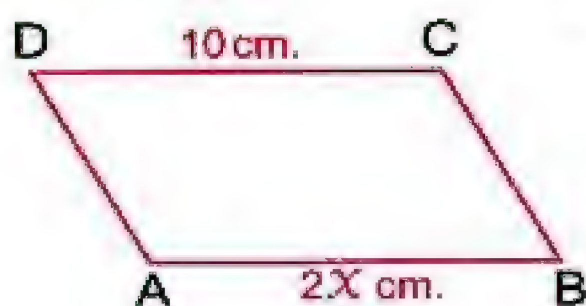


Fig. (1)

A rectangle

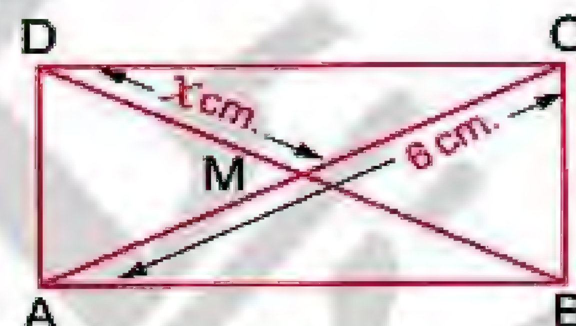


Fig. (2)

A square

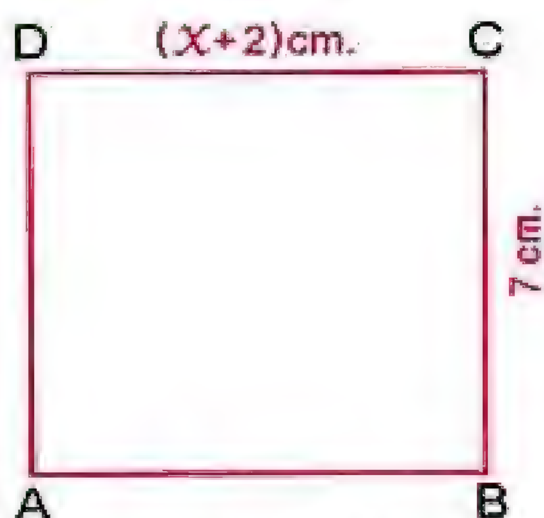


Fig. (3)

A rhombus

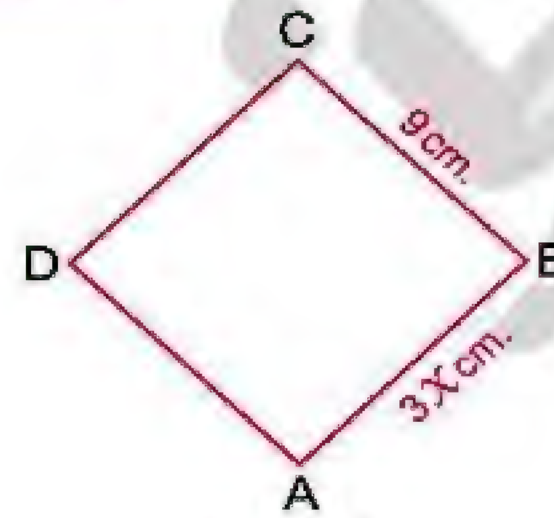


Fig. (4)

1 Lesson

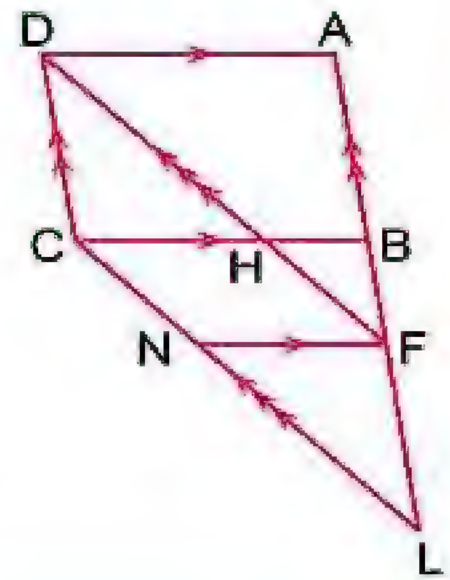
16 In the opposite figure :

$\overline{AD} \parallel \overline{BC}$, $\overline{AB} \parallel \overline{DC}$ and $\overline{DF} \parallel \overline{CL}$

(1) Name 3 parallelograms in the figure.

(2) Name 3 triangles in the figure.

(3) Write the type of the figure ALCD (Suez 2014)

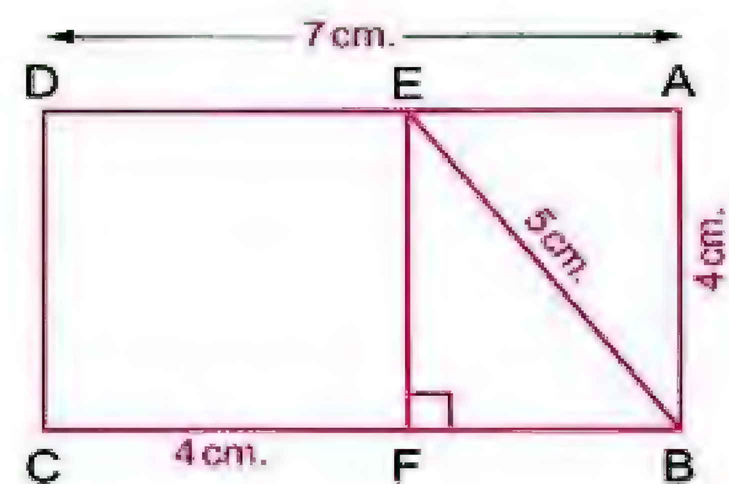


17 In the opposite figure :

ABCD is a rectangle , $\overline{EF} \perp \overline{BC}$,
AB = 4 cm. , AD = 7 cm. , BE = 5 cm.
and FC = 4 cm.

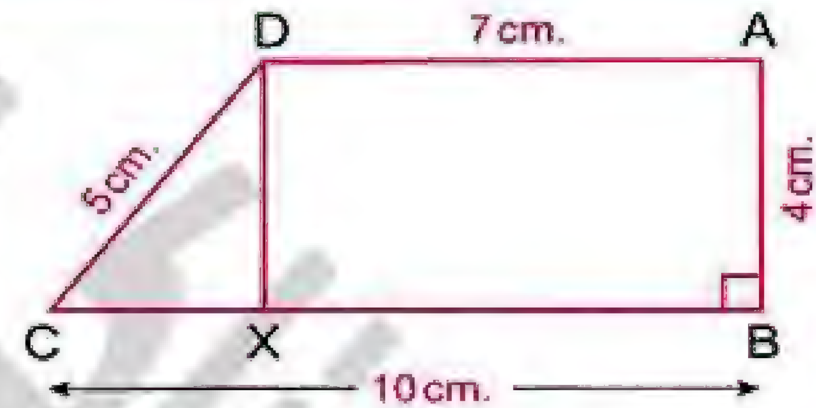
(1) Calculate the area of the figure ABFE

(2) Write the type of the figure EBCD and calculate its perimeter.



18 In the opposite figure :

ABCD is a trapezium in which :
m (∠ B) = 90° , AD = 7 cm. , AB = 4 cm. ,
BC = 10 cm. and DC = 5 cm.
Locate the point X on $\overline{BC}$ for
the figure ABXD is a rectangle , in this case complete :



- AB = ... = ... cm.
- AD = ... = ... cm.
- The perimeter of the rest of the figure = ... cm. (Red Sea 2015)

19 In the opposite figure :

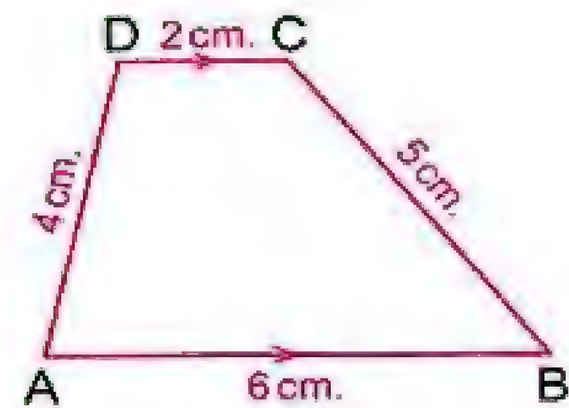
ABCD is a trapezium in which :
$\overline{AB} \parallel \overline{CD}$, m (∠ A) = 90° , AB = 6 cm. ,
AD = 4 cm. , CD = 9 cm. and BC = 5 cm.
Put the point E on $\overline{CD}$ to make the figure
ABED be a rectangle , then find :

(1) m (∠ BEC) and the length of $\overline{BE}$

(2) The area of the figure ABCD (Cairo 2014)



20 In the opposite figure :



ABCD is a trapezium in which :

AB = 6 cm. , BC = 5 cm. ,

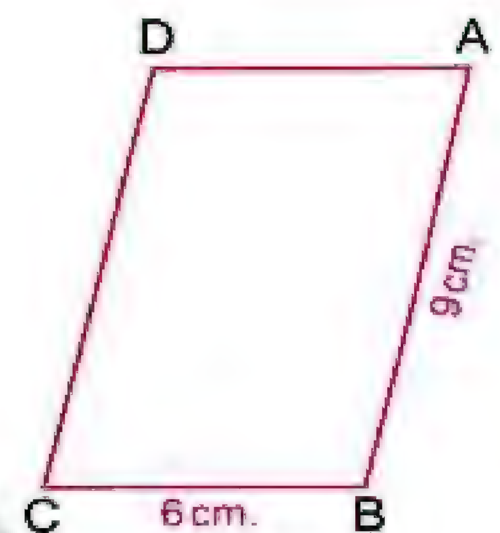
CD = 2 cm. and DA = 4 cm.

Put E on the side $\overline{AB}$ to get the parallelogram AECD , then complete :

(a) The perimeter of the parallelogram AECD = ... cm.

(b) The type of Δ CBE according to its sides is ....

21 In the opposite figure :



ABCD is a parallelogram in which :

AB = 9 cm. and BC = 6 cm.

Determine the point X on the side $\overline{AB}$ such that : AX = BC and determine the point Y on the side $\overline{DC}$ such that : DY = BC , complete the following :

(a) The figure AXYD represents .... because ....

(b) The figure ABCY represents .... because ....

(c) The figure XBCY represents .... because ....

(d) The type of Δ AXY according to its sides is .... because ....

22 In the opposite figure :



XYZL is a rectangle in which :

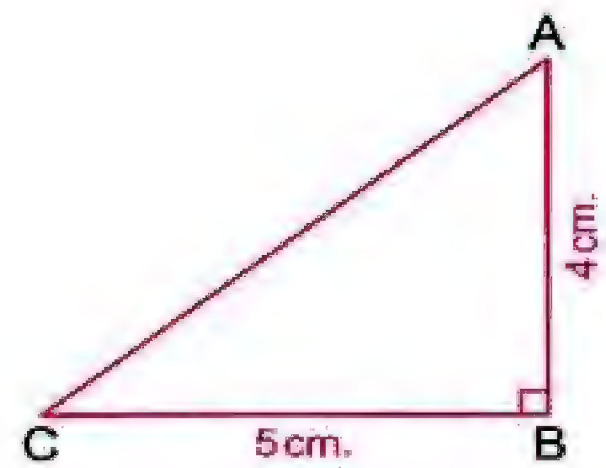
XY = 5 cm. and YZ = 7 cm.

(a) Show in steps how you can draw a square inside the rectangle such that : $\overline{XY}$ is one of its sides

(b) Write all the parallelograms which are obtained in the figure.

23 In the opposite figure :

ABC is a right-angled triangle at B in which : AB = 4 cm. and BC = 5 cm. Try to draw a parallelogram in each of the following cases :



(a) A parallelogram such that $\overline{AB}$ is a diagonal of it.

(b) A parallelogram such that $\overline{AC}$ is a diagonal of it.

24 The ratio between the measures of two consecutive angles in a parallelogram equals 4 : 5 Find the measure of each. (Giza 2012)

25 Write the name of the figure through the following descriptive statements :

	The descriptive statements for the figure	The name of the figure
1.	The figure ABCD in which : • AB = BC = CD = DA • The two diagonals are perpendicular and not equal in length. • m (∠ A) ≠ m (∠ B)	....
2.	The figure XYZL in which : • XY = ZL , YZ = XL and XY ≠ YZ • The two diagonals are equal in length.	....
3.	The figure DEFL in which : • DE = LF , FE = DL and DE ≠ FE • The two diagonals are not equal in length. • m (∠ D) ≠ m (∠ E)	....
4.	The figure ABCD in which : • AB = BC = CD = DA • The two diagonals are equal in length and perpendicular.	....

26 Complete the following :

(a) ABCD is a parallelogram in which : m (∠ A) = 50° , then m (∠ C) = ... °

(b) ABCD is a parallelogram in which : m (∠ A) = 75° , then m (∠ D) = ... °

(c) If ABCD is a rectangle in which : AC = 5 cm. , then BD = ... cm.

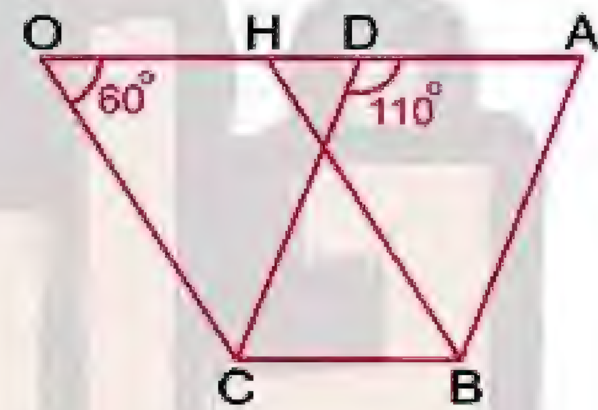
(d) If the lengths of two consecutive sides of a parallelogram are 3 cm. and 5 cm. , then its perimeter equals .... cm.

(e) If the perimeter of a parallelogram is 25 cm. and if one of its sides is of length 7 cm., then the consecutive side is of length .... cm.



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27 In the opposite figure :



ABCD and HBCO are two parallelograms such that m (∠ O) = 60° and m (∠ ADC) = 110°

Without using geometrical instruments ,

Find : m (∠ ABH)



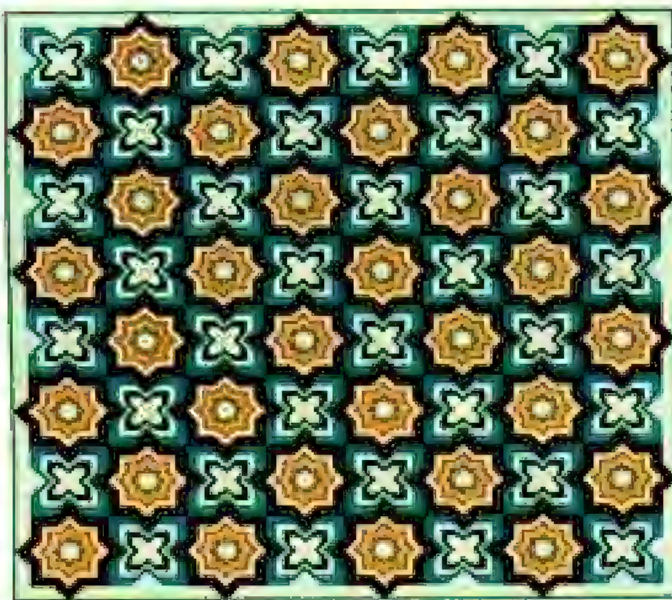
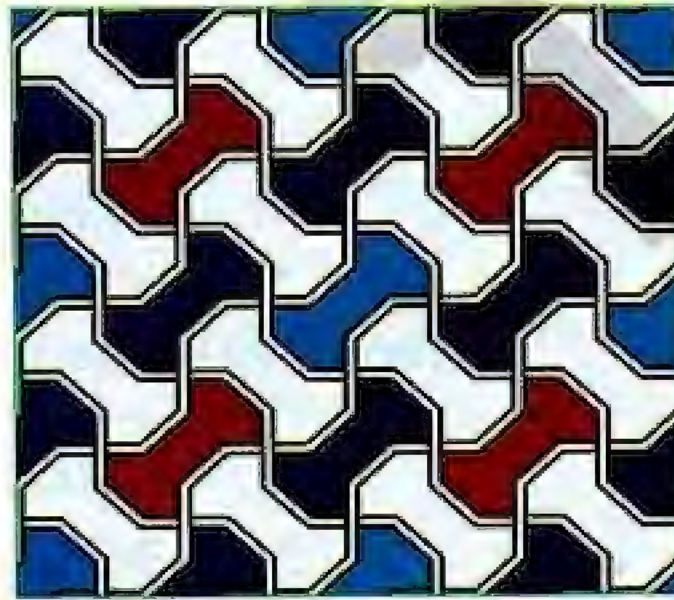
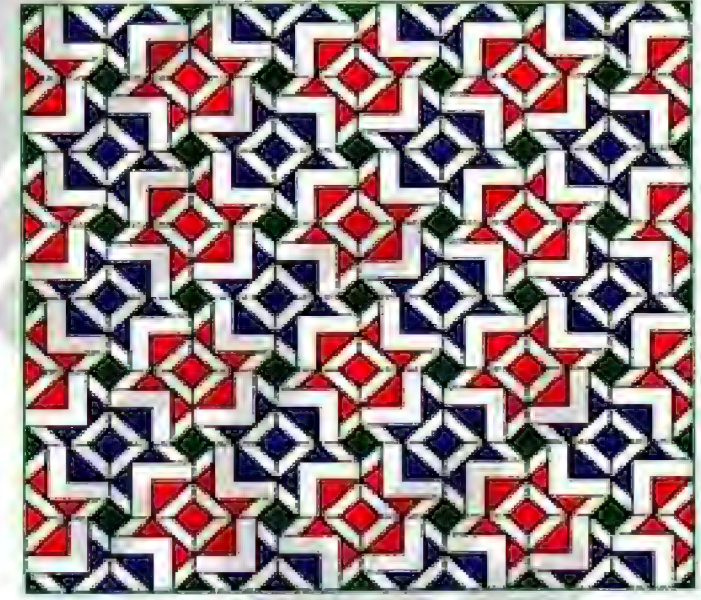
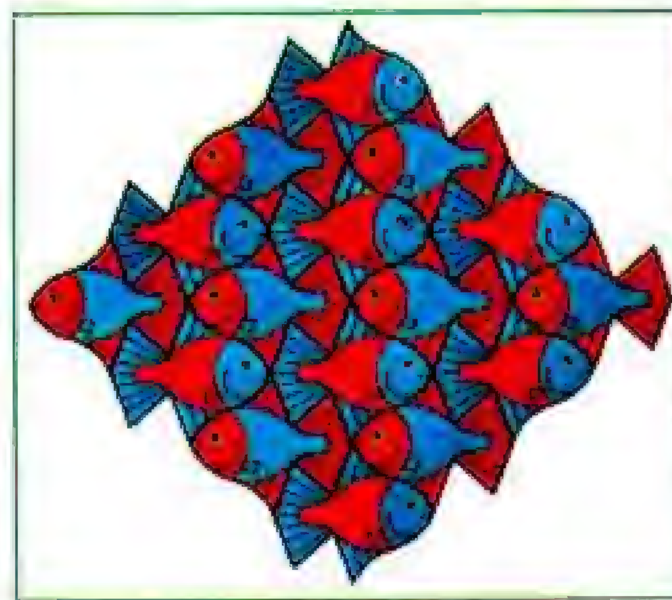
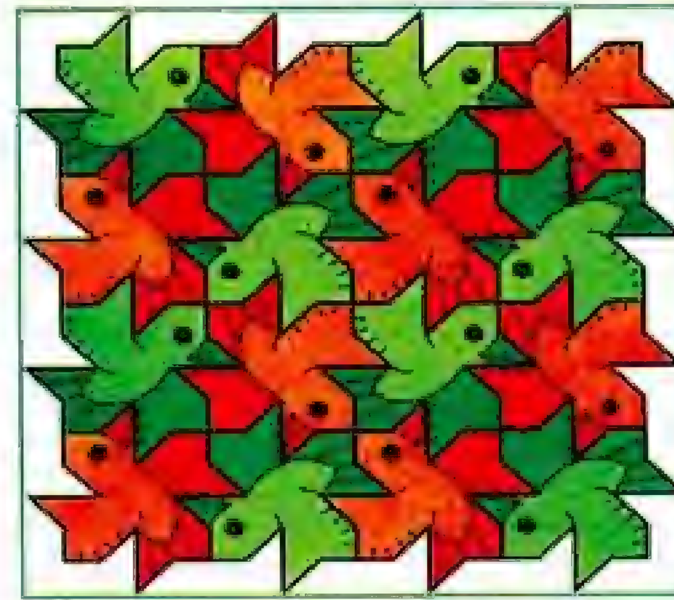
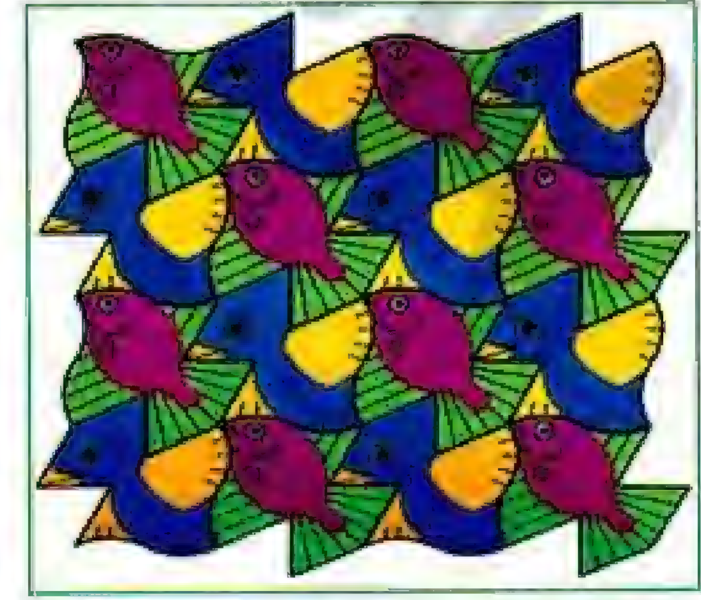


Lesson 2

Visual patterns

A pattern is a sequence of symbols or figures arranged according to a certain system or rule.

You can see a lot of visual patterns in your daily life , such as in tessellations , for example :

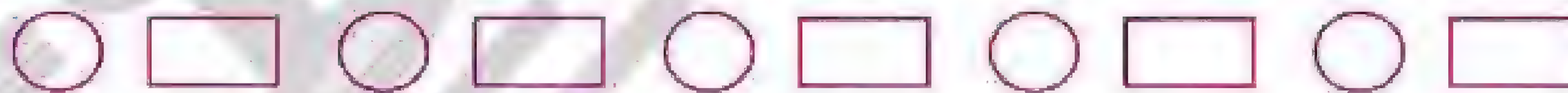


Pattern unit

In visual patterns , usually you can find a unit which is repeated several times.

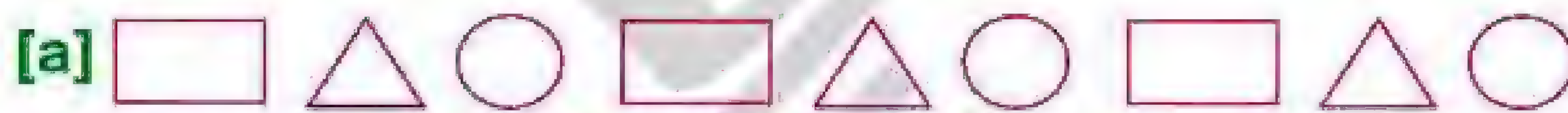
For example :

In the following pattern , the repeated unit is

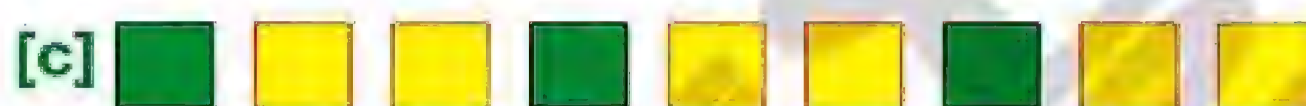


Example 1

Find the repeated unit in each of the following patterns :

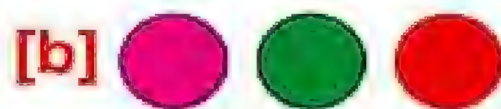
[a] 

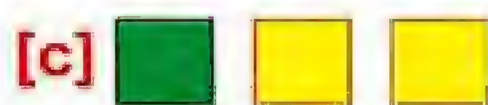
[b] 

[c] 

Solution

[a] 

[b] 

[c] 

Example 2

Find the repeated unit in each pattern , then find the missing figure :

[a] 

[b] 

2 Lesson

Solution

[a] The repeated unit is ▲ ■ ■ and the missing figure is ▲

[b] The repeated unit is △ ▲ and the missing figures are △ , ▲

Try by yourself

Discover the rule in each of the following patterns , then complete it twice :

[a] ☆ ○ △ ☆ ○ △ ☆ ....

[b] ☺ ☺ ☺ ☺ ....

[c] ◪ ◪ ◪ ◪ ....

Exercise 13 Visual patterns


Solve Exercise

From the school book

1 Discover the pattern in each case of the following and describe it , then complete its repetition twice :

(a) !!?? !!?? ....

(b) □ □ △ □ □ △ ....

(c) △ ○ □ △ ○ □ .... (Port Said 2013)

(d) ....

(e) ....

(f) ....

(g) ....

(h) ....

2 Discover the rule , then complete the following :

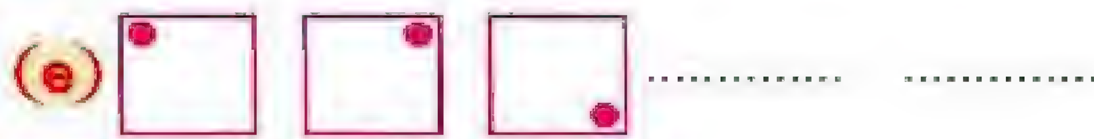
(a) .... (El-Dakahlia 2011)

(b) ....

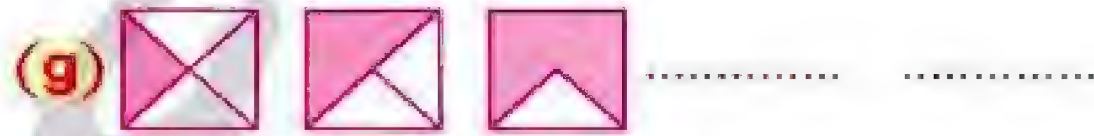
(c) .... (Aswan 2011)

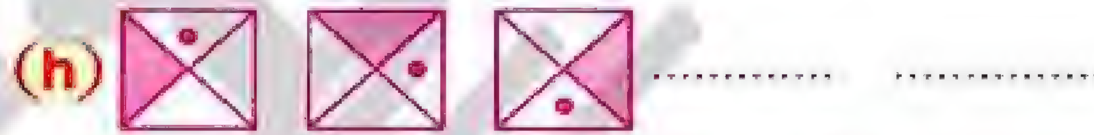
(d) .... (Beni Suef 2014)

2
Lesson

(e)  ....

(f)  .... (Beni Suef 2011)

(g)  ....

(h)  ....

(i)  ....

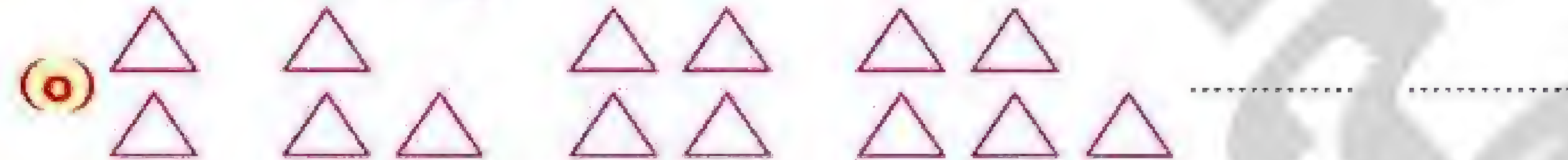
(j)  ....

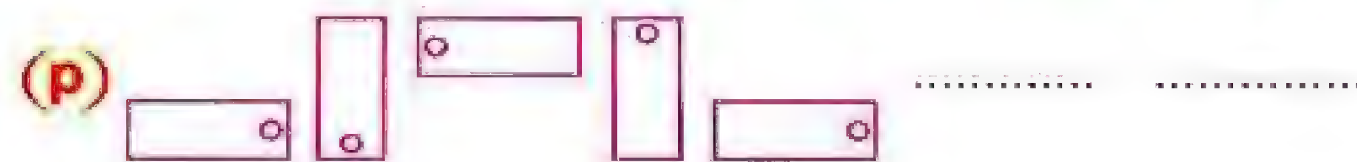
(k)  ....

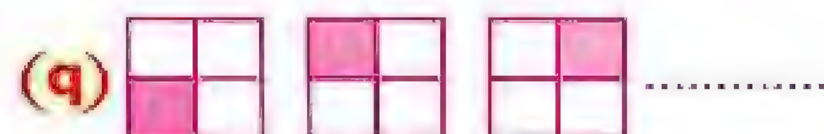
(l)  ....

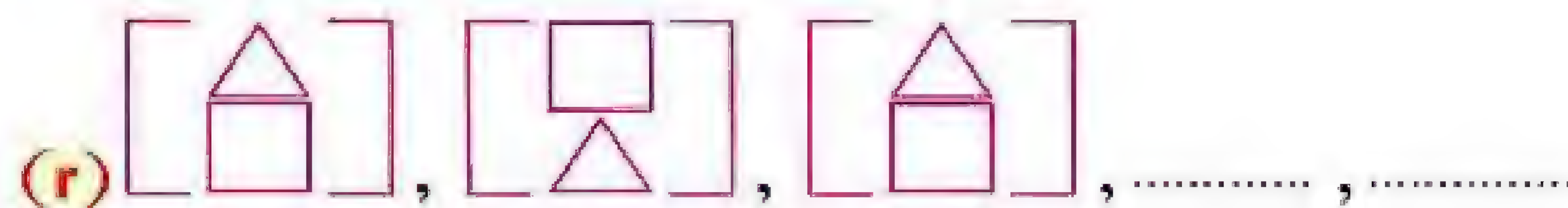
(m)  .... (Damietta 2011)

(n)  ....

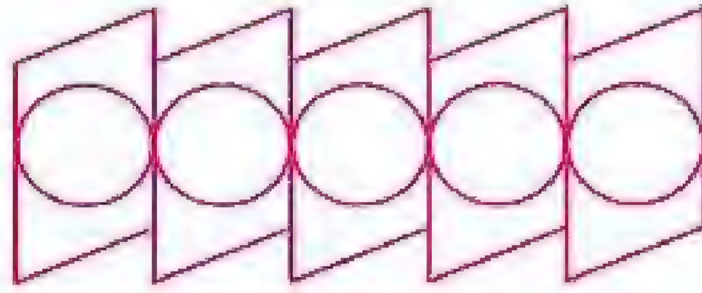
(o)  ....

(p)  ....

(q)  .... (Aswan 2012)

(r)  , ... , ... (Suez 2012)

3 Discover the pattern , describe it , then complete by repeating it (twice):



4 Study the following geometric shapes , form visual patterns from it , then describe each pattern and repeat it twice :

The shapes 

For example :



(the description of the pattern is repeating ⬡ ◯ ◇)

(a) .... (the description of the pattern ....)

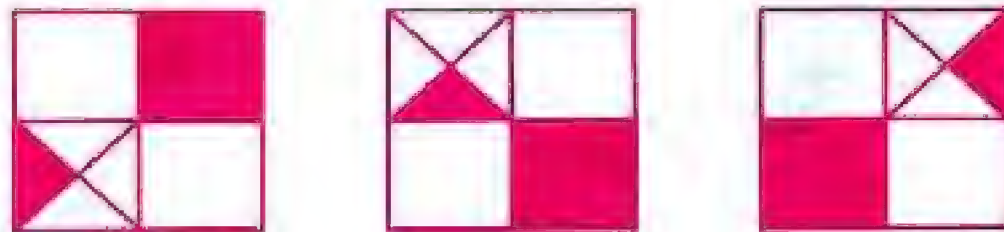
(b) .... (the description of the pattern ....)

5 Discover the rule and complete by drawing and colouring the next figure :



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6 Discover the pattern and draw the next shape :





Lesson 3

Volumes

Solids

What is a solid ?

Any object that occupies a room in the space is called a solid.

Examples for solids :



• Some solids have geometric shapes such as :

A book	Cuboid	A dice	Cube
A ball	Sphere	A birthday hat	Cone
A battery	Cylinder	Khufu Pyramid	Pyramid

• Some other solids have no geometric shapes such as :

A piece of a stone	A car
A potato	A pair of shoes

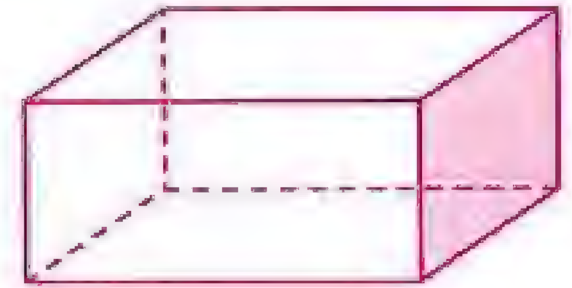
Now we will study only two geometrical solids :

The CUBOID and the CUBE

3 Lesson

1 The cuboid

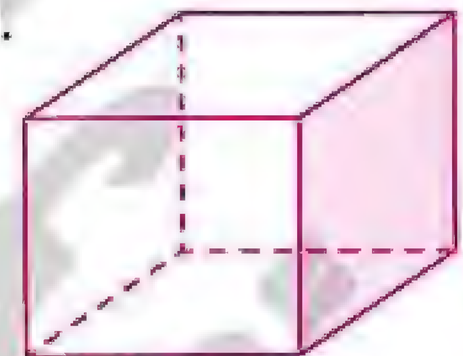
- A cuboid is a geometrical solid that has the shape of a box.
- It is composed of six faces , all of these are rectangles.
- The top and the bottom rectangles are bases and the other four rectangles are the lateral faces.



- Any two opposite faces are parallel and congruent (equal in area).
- The line segments where two adjacent faces intersect are the edges.
- It has 12 edges.
- It has 8 vertices.
- It has 3 dimensions : length , width and height.

2 The cube

- A cube is a geometrical solid that has the shape of a regular dice.
- It is composed of six faces , all these faces are congruent squares (equal in area) and each two opposite faces are parallel.



- Any two opposite faces could be considered as bases and the other four squares are the lateral faces.
- The line segments where two adjacent faces intersect are the edges.
- It has 12 edges.
- It has 8 vertices.
- It has 3 equal dimensions.

Volumes

Definition

The number of units which a solid consists of is called the volume of the solid.

1 Measuring the volume of a solid using some identical solids

You can use any identical solid as a unit to measure the volume as :

bar of soap , box of matches , carton of milk , ... , etc.

In this case :

- The identical solids are considered as "units" of measuring the volume.
- The number of these identical solids will be the volume of the solid.

For example :

Mina formed two shown solids using some identical solids.



Fig. (1)

Number of cartons of milk = 9 , then its volume = 9 cartons of milk.



Fig. (2)

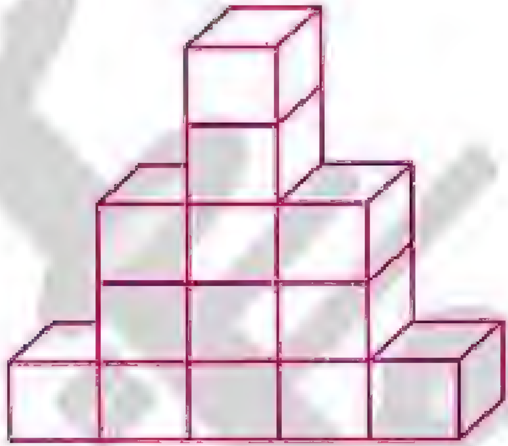
Number of bars of soap = 21 , then its volume = 21 bars of soap.

3 Lesson

Example 1

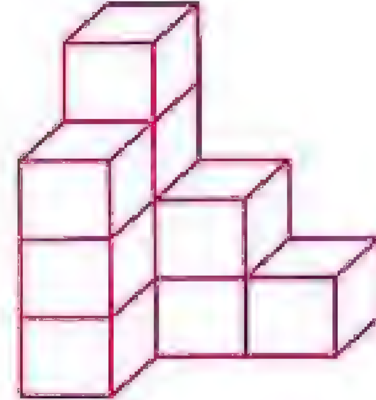
Find the volume of each solid using ⬜ (cube game) as a unit to measure the volume :

[a]



Number of cubes = ...
, then the volume = ... ⬜

[b]



Number of cubes = ...
, then the volume = ... ⬜

Solution

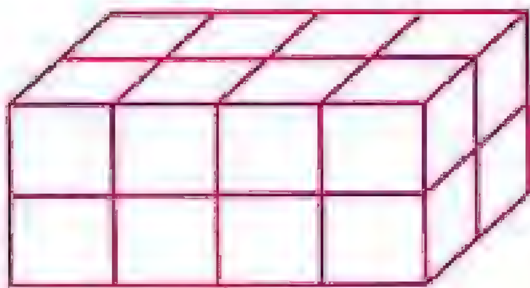
[a] The number of cubes = 13 , then the volume = 13 ⬜

[b] The number of cubes = 10 , then the volume = 10 ⬜

Example 2

Find the volume of each of the following solids by using the given unit in each :

[a]



The volume = ... ⬜

[b]



The volume = ... ▭

Solution

[a] The volume = 16 ⬜

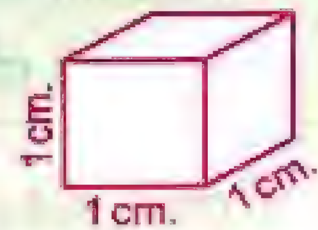
[b] The volume = 8 ▭

2 Measuring the volume of a solid using standard units

The standard volume units are cubic units , such as cubic centimetres (cm^3) , cubic metres (m^3).

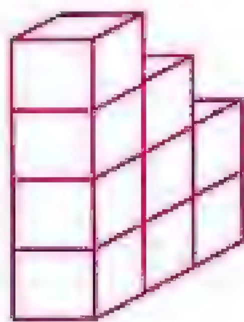
The cubic centimetre (cm^3)

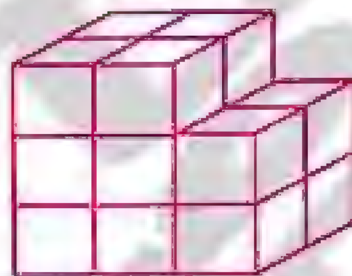
- The cubic centimetre is the volume of a cube of edge length that equals 1 cm.
- This unit is used to measure the volume of a carton of milk , a box of soap , a box of matches , ... , etc.

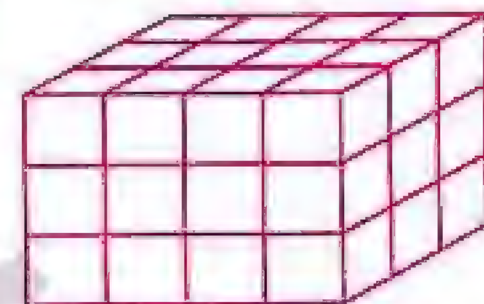


Example 3

Find the volume of each of the following solids (consider the volume of ▢ = 1 cm^3) :

[a]


[b]


[c]


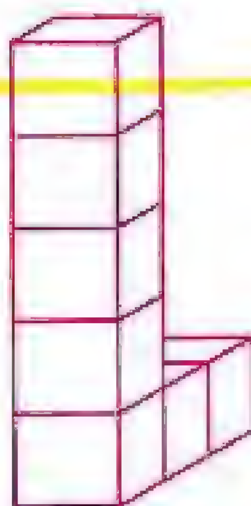
Solution

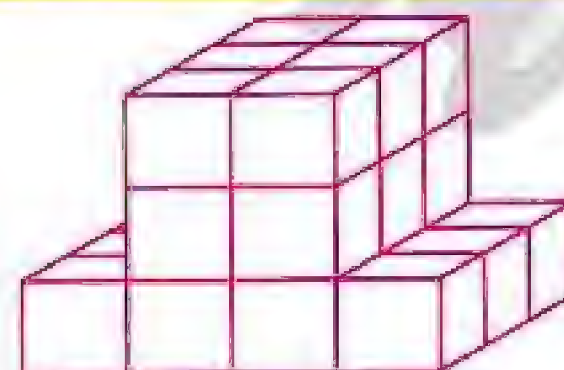
[a] 9 cm^3 [b] 16 cm^3 [c] 36 cm^3

Try by yourself

Find the volume of each of the following solids (consider the volume of ▢ = 1 cm^3) :

[a]


[b]


[c]


3 Lesson

Other standard units for measuring volumes

(1) The cubic decimetre (dm^3)

- The cubic decimetre is the volume of a cube of edge length 1 dm.
- This unit is used to measure the volume of a carton of TV, a carton of washing machine , a carton of computer , ... , etc.

$1 \text{ dm}^3 = 1 \text{ dm.} \times 1 \text{ dm.} \times 1 \text{ dm.}$

Since 1 dm. = 10 cm.

then , $1 \text{ dm}^3 = 10 \text{ cm.} \times 10 \text{ cm.} \times 10 \text{ cm.} = 1000 \text{ cm}^3$

(2) The cubic metre (m^3)

- The cubic metre is the volume of a cube of edge length 1 m.
- This unit is used to measure the volume of a container , a building , , ... , etc.

$1 \text{ m}^3 = 1 \text{ m.} \times 1 \text{ m.} \times 1 \text{ m.}$

Since 1 m. = 10 dm.

then , $1 \text{ m}^3 = 10 \text{ dm.} \times 10 \text{ dm.} \times 10 \text{ dm.} = 1000 \text{ dm}^3$

And since 1 m. = 100 cm.

then , $1 \text{ m}^3 = 100 \text{ cm.} \times 100 \text{ cm.} \times 100 \text{ cm.} = 1000\,000 \text{ cm}^3$

(3) The cubic millimetre (mm^3)

- The cubic millimetre is the volume of a cube of a edge length 1 mm.
- This unit is used to measure the volume of small solids.

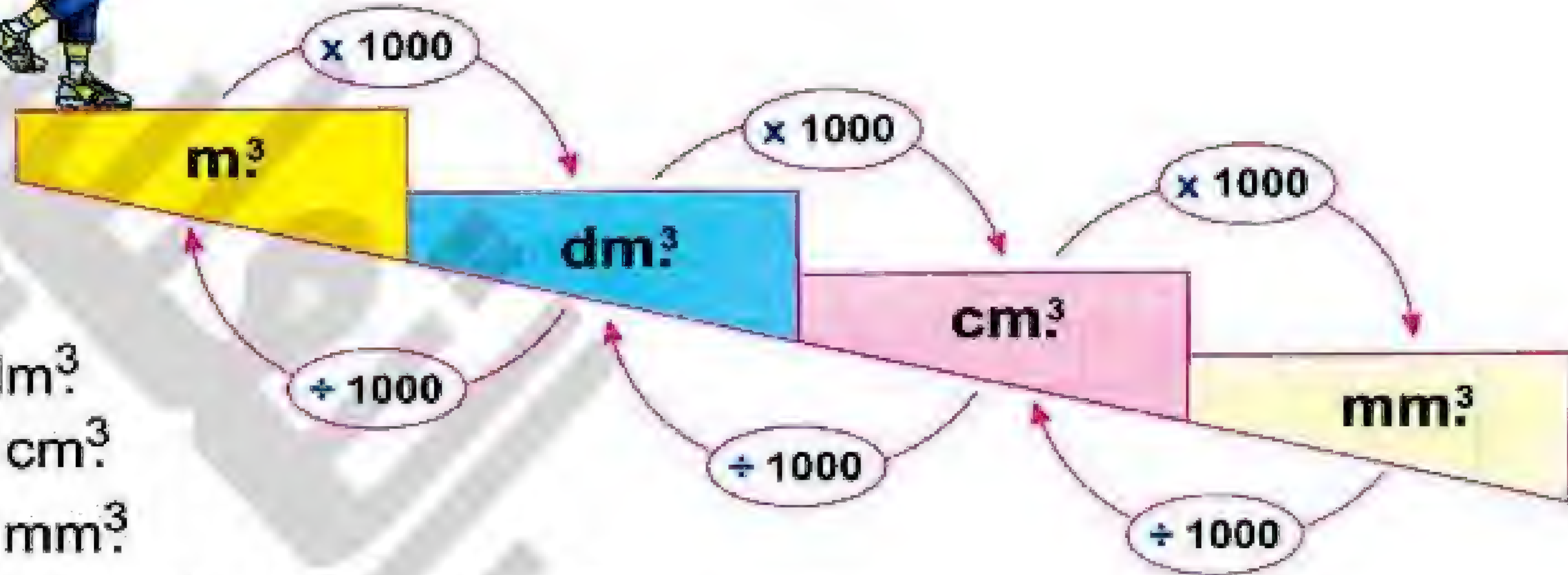
$1 \text{ mm}^3 = 1 \text{ mm.} \times 1 \text{ mm.} \times 1 \text{ mm.}$

Since 1 mm. = 0.1 cm.

then , $1 \text{ mm}^3 = 0.1 \text{ cm.} \times 0.1 \text{ cm.} \times 0.1 \text{ cm.} = 0.001 \text{ cm}^3$

Converting units





1 m³ = 1000 dm³
1 dm³ = 1000 cm³
1 cm³ = 1000 mm³
1 m³ = 1000 000 cm³
1 cm³ = 0.001 dm³

Remember that :

1. To convert a larger unit to a smaller one , you have to multiply.
2. To convert a smaller unit to a larger one , you have to divide.

Example 4

Complete :

[a] 6 m³ = ... × .... = ... dm³
[b] 0.7 cm³ = ... × .... = ... mm³
[c] 80 000 cm³ = ... ÷ .... = ... dm³
[d] 0.8 dm³ = ... cm³

Solution

[a] 6 m³ = 6 × 1000 = 6 000 dm³
[b] 0.7 cm³ = 0.7 × 1000 = 700 mm³
[c] 80 000 cm³ = 80 000 ÷ 1000 = 80 dm³
[d] 0.8 dm³ = 800 cm³

Exercise 14 Volumes

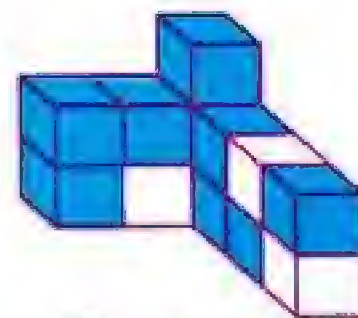


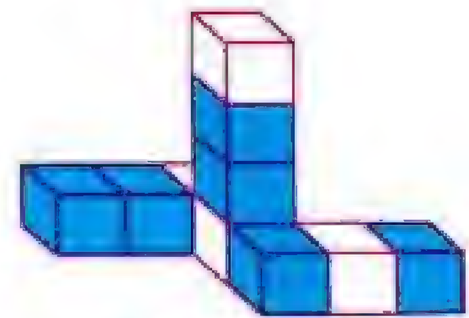
From the school book

1 Find the volume of each of the following solids and consider the measuring unit of volume (▢) is cm^3. :

(a) 📖 The volume = ... cm^3.	(b) The volume = ... cm^3.	(c) The volume = ... cm^3.
(d) 📖 The volume = ... cm^3.	(e) 📖 The volume = ... cm^3.	(f) (Red Sea 2015) The volume = ... cm^3.
(g) 📖 The volume = ... cm^3.	(h) 📖 The volume = ...	(i) The volume = ...
(j) 📖 The volume = ...	(k) 📖 The volume = ...	(l) The volume = ...

2 Find the volume of each of the opposite solids considering the volume's unit is the games cube whose volume is 8 cm^3


First solid


Second solid

3 Complete :

(a) The solid is .... (Qena 2014)

(b) The cuboid has .... faces , each face is a .... and each two opposite faces are .... in area.

(c) The cube has .... faces , each face is a .... and they are all equal in ....

(d) The number of edges of the cuboid is ....

(e) The number of vertices of the cube is ....

(f) The edges of the cube are .... in length.

(g) The number of edges of the cube is ....

(h) The number of units which a solid consists of is called the .... of the solid.

(i) The line segment resulted from intersection of two faces is called ....

(j) The cubic centimetre is ....

4 Complete :

(a) 4 m^3 = ... = ... dm^3 (El-Sharkia 2015)

(b) 120 dm^3 = ... = ... cm^3 (El-Monofia 2013)

(c) 6 500 dm^3 = ... = ... m^3 (El-Beheira 2011)

(d) 8 200 mm^3 = ... = ... cm^3

(e) 5 cm^3 = ... = ... mm^3

(f) 4 300 cm^3 = ... = ... dm^3

(g) 3 m^3 = ... = ... mm^3

(h) 0.07 dm^3 = ... = ... mm^3

(i) 2.1 cm^3 = ... = ... mm^3

(j) 2 580 000 mm^3 = ... = ... m^3

(k) 0.001 cm^3 = ... = ... mm^3

3 Lesson

5 Choose the correct answer :

(a) The cubic centimetre is a unit of measuring .... (Ismailia 2015)

(the perimeter or the area or the volume or the length)

(b) The number of vertices of the cuboid is .... (8 or 12 or 6 or 4)

(c) The number of edges of the cube = ... edges. (Beni Suef 2011)

(6 or 8 or 10 or 12)

(d) The number of faces of the cuboid is .... (Giza 2013)

(6 or 8 or 10 or 12)

(e) The number of faces of the cube-shaped box without a lid is ....

(6 or 8 or 5 or 4)

(f) 1 dm^3 = ... cm^3 (10 or 100 or 1 000 or 10 000)

(g) 10 cm^3 = ... dm^3 (0.1 or 0.01 or 0.001 or 10)

(h) 2 m^3 = ... dm^3 (El-Sharkia 2016) (2 or 20 or 200 or 2 000)

(i) 1 cm^3 = ... dm^3 (1 or 10 or 1 000 or $\frac{1}{1\ 000}$)

(j) 12 cm^3 = ... mm^3 (0.012 or 120 or 1 200 or 12 000)

(k) 0.3 m^3 = ... dm^3 (Ismailia 2016)

(3 000 or 300 or 30 or 3)

(l) 4 200 000 cm^3 = ... m^3 (Alexandria 2017)

(42 or 420 or 4.2 or 4 200)

(m) 200 000 mm^3 = ... m^3 (2 or 0.2 or 200 or 0.0002)

(n) 100 mm^3 equals .... dm^3 (Port Said 2013)

($\frac{1}{10\ 000\ 000}$ or $\frac{1}{1\ 000\ 000}$ or $\frac{1}{100\ 000}$ or $\frac{1}{10\ 000}$)

(o) The best unit for estimating the volume of a container is ....

(mm^3 or cm^3 or m^2 or m^3)

(p) 5 m^3 = ... (Luxor 2014)

(5 000 dm^3 or 5 000 cm^3 or 500 dm^3 or 5 000 dm.)

(q) If the edge length of a cube is 9 cm., then the sum of the lengths of its edges in metre equals .... (Port Said 2013)

(0.72 or 0.9 or 1.08 or 1.44)

Lesson 4

Volume of the cuboid

Prelude

- Put 3 cubes as shown in solid (1) such that the edge length of each cube = 1 cm.
- Then , the volume of the solid (1) = 3 cm^3.



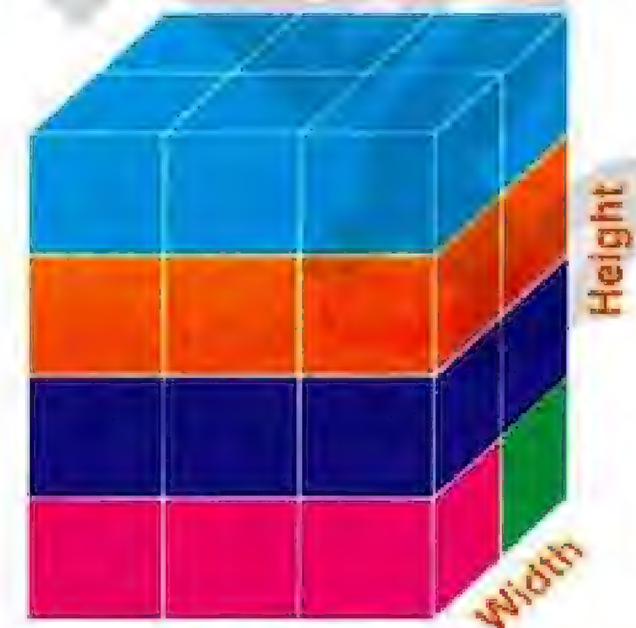
Solid (1)

- Form another similar row to the solid (1) and put it beside the solid (1) as shown to form the solid (2)
- Then , the volume of the solid (2) = The volume of solid (1) × 2 = 3 × 2 = 6 cm^3.



Solid (2)

- Form other three layers like the previous layer and put them on it as shown to form the solid (3)
- Then , the volume of the solid (3)
  = The volume of previous layer × 4
  = (3 × 2) × 4
  (3 ↓ Length) (2 ↓ Width) (4 ↓ Height)



Solid (3)



Lesson 4

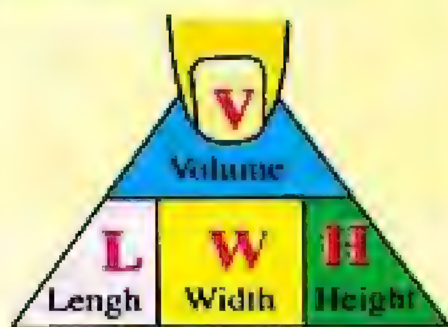
Rule

The volume of the cuboid = length × width × height
= L × W × H
= The product of the three dimensions

Since the base area = length × width , then :

The volume of the cuboid = base area × height
= B.A. × H

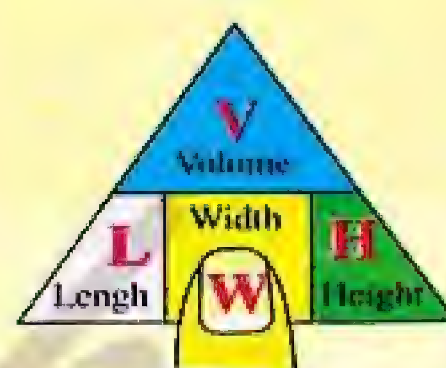
Notice that :



$V = L \times W \times H$



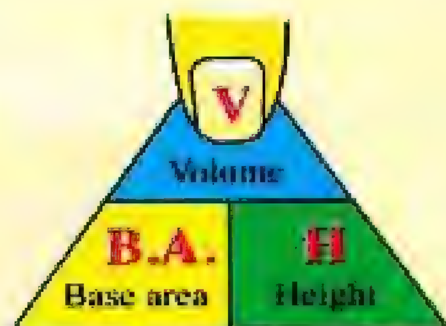
$L = \frac{V}{W \times H}$



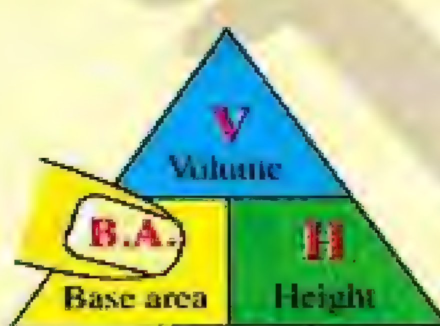
$W = \frac{V}{L \times H}$



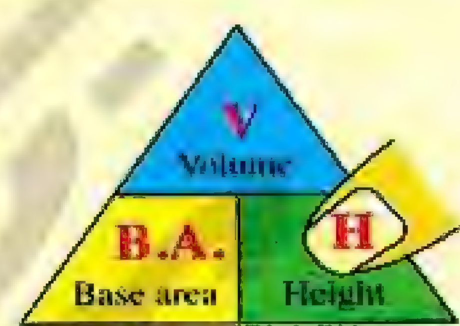
$H = \frac{V}{L \times W}$



$V = B.A. \times H$



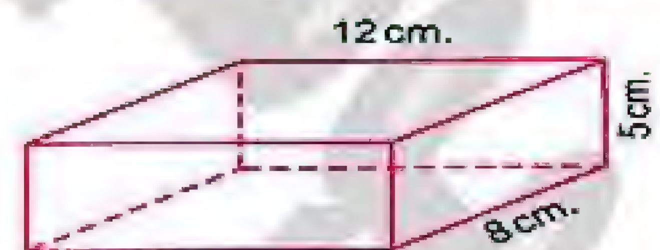
$B.A = \frac{V}{H}$



$H = \frac{V}{B.A.}$

Example 1

Find the volume of the opposite cuboid.



Solution

The volume of the cuboid = the product of its three dimensions
$= 12 \times 8 \times 5 = 480 \text{ cm}^3$

Example 2

The dimensions of a cuboid are 4 cm. , 3 cm. and 8 cm. Find its volume.

Solution

The volume of the cuboid = the product of its three dimensions

$= 3 \times 4 \times 8 = 96 \text{ cm}^3$

Example 3

Which is greater in volume ?

a cuboid of dimensions 7 cm. , 6 cm. and 8 cm.

or a cuboid of base area 30 cm^2 and its height is 12 cm.

Solution

The volume of the first cuboid = L × W × H

$= 7 \times 6 \times 8 = 336 \text{ cm}^3$

The volume of the second cuboid = base area × height

$= 30 \times 12 = 360 \text{ cm}^3$

Therefore , the second cuboid is greater in volume than the first cuboid.

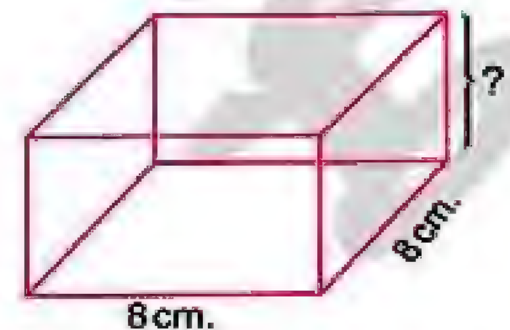
Try by yourself

The dimensions of a cuboid are 20 cm. , 15 cm. and 10 cm.

Find its volume.

Example 4

A cuboid has a square base of side length 8 cm. What is the height of the cuboid if its volume is 384 cm.^{3} ?



Solution

The height $= \dfrac{\text{volume}}{\text{base area}} = \dfrac{384}{8 \times 8} = 6$ cm.

Example 5

The volume of a cuboid is 720 cm^3 and its height is 9 cm. Find its base area.

Solution

The base area = $\frac{V}{H} = \frac{720}{9} = 80$ cm^2.

Example 6

A box is in the shape of a cuboid of dimensions 30 cm. , 21 cm. and 6 cm. If it is filled with cuboid-shaped pieces of sweets of dimensions 5 cm. , 3 cm. and 2 cm.

Find the number of pieces of sweets.



Solution

The volume of the box = L × W × H

= $30 \times 21 \times 6$ cm^3

We use this law just when each dimension of the greater cuboid is divisible by a corresponding dimension of the smaller cuboid

The volume of each sweet piece = $5 \times 3 \times 2$ cm^3

The number of pieces = $\frac{\text{the volume of the box}}{\text{the volume of each sweet piece}}$

$= \frac{30 \times 21 \times 6}{5 \times 3 \times 2} = 126$ pieces.

Example 7

A swimming pool is in the shape of a cuboid , its base is of length 60 metres and its width is 40 metres.

Find its depth if 3 600 m^3 of water fill this swimming pool completely.



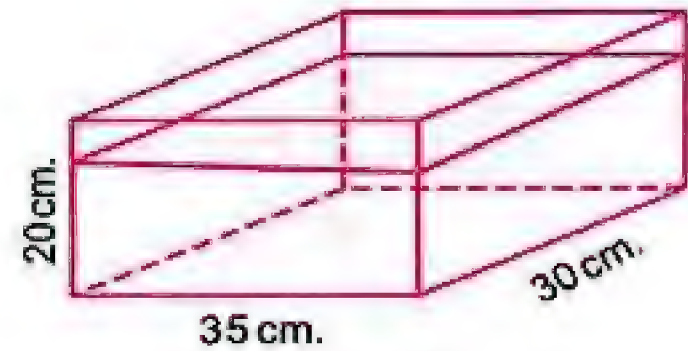
Solution

The volume of the swimming pool = length × width × depth

Therefore , its depth = $\frac{\text{the volume}}{\text{length} \times \text{width}} = \frac{3\,600}{60 \times 40}$ = 1.5 metres.

Example 8

15 750 cm^3 of water is poured into a vessel in the shape of a cuboid with internal dimensions 35 cm. , 30 cm. and 20 cm.



Find :

[a] The height of water in the vessel.

[b] The volume of water needed to be added for the vessel to be filled with water completely.

Solution

[a] The height of water = $\frac{\text{the volume of water}}{\text{the base area}} = \frac{15\,750}{35 \times 30}$ = 15 cm.

[b] The volume of water needed to be added for the vessel to be filled with water completely can be obtained by two methods.

The first method :

The volume of the whole vessel = 35 × 30 × 20 = 21 000 cm^3

The volume of the added water = 21 000 – 15 750 = 5 250 cm^3

The second method :

We calculate the volume of the empty part of the vessel.

Then , the volume of the added water = 35 × 30 × (20 – 15)

= 35 × 30 × 5 = 5 250 cm^3

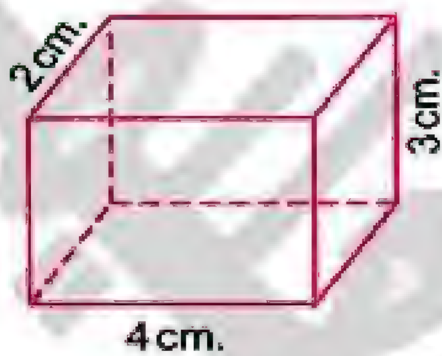
Exercise 15 Volume of the cuboid


Solve Exercise

From the school book

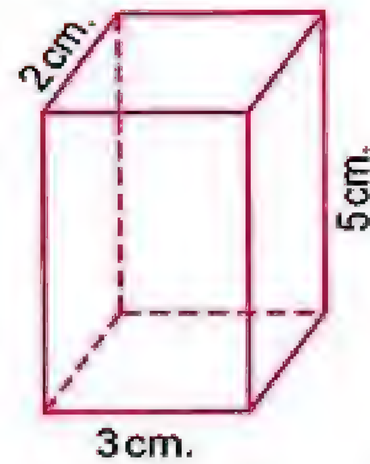
1 Find the volume of each of the following :

(a)



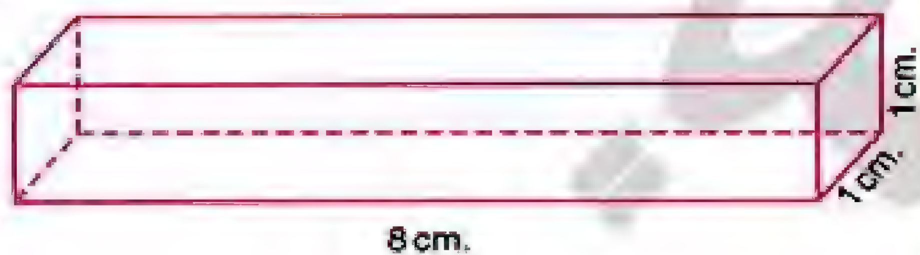
Volume = ... cm^3

(b)



Volume = ... cm^3

(c)



Volume = ... cm^3

(d)



Volume = ... cm^3

2 Complete the following table :

Dimensions of cuboid (cm.)			Base area (cm^2)	Volume (cm^3)
Length	Width	Height		
4	3	7	....	....
7	8	9	....	....
5	11	....	....	440
7	....	13	28	....
12	....	18	....	3 240
25	16	....	....	14 800





3 Complete the following table :

Base area (cm^2)	Height (cm.)	Volume (cm^3)
42	5	....
80	9	....
22.5	....	1 125
37.5	....	1 500
....	38	1 235
....	27.5	1 787.5

4 Complete :

(a) The volume of the cuboid = ... × .... × ....

(b) The volume of the cuboid = ... × .... (Luxor 2015)

(c) The height of a cuboid = $\frac{..........}{..........}$

(d) The volume of the cuboid whose dimensions are 2 cm. , 3 cm. and 5 cm. = ... cm^3 (El-Gharbia 2016)

(e) The volume of the cuboid with base area 160 cm^2 and height 10 cm. is ....

(f) If the volume of a cuboid is 27 cm^3 and its height is 3 cm. , then the area of its base is .... cm^2 (Giza 2013)

(g) The area of a rectangular base of a cuboid whose volume is 245 cm^3 and its height is 35 cm. is ....

(h) If the volume of a cuboid is 64 cm^3 and the area of its base is 16 cm^2 , then its height = ... cm. (Kafr El-Sheikh 2015)

5 Choose the correct answer :

(a) A cuboid with a square base of side length 6 cm. and height 10 cm. , then its volume is .... (36 cm^3 or 60 cm^2 or 60 cm^3 or 360 cm^3)

(b) The volume of a cuboid equals 400 cm^3 and its base is with length = 8 cm. and width = 5 cm. , then its height = ... cm. (Souhag 2016)

(50 or 10 or 80 or 20)



4 Lesson

(c) The volume of a cuboid is 54 cm^3 , its base is square-shaped of side length 3 cm. , then its height = ... cm. (Ismailia 2012)

(42 or 8.5 or 6 or 4.5)

(d) The base of a cuboid is a square , its volume is 2 000 cm^3 and its height is 5 cm. , then the side length of its base is .... cm.

(100 or 200 or 20 or 400)

(e) The volume of a cuboid with a square base is 800 cm^3 , its height is 8 cm. , then its base side length is ....

(100 cm^2 or 20 m. or 5 cm. or 10 cm.)

(f) A cuboid in which the sum of its dimensions is 9 cm. , then the sum of its edge lengths = ... cm. (18 or 27 or 36 or 45)

6 Find the volume of a cuboid with dimensions 12 cm. , 10 cm. and 8 cm. (Giza 2016)

7 Find the volume of a cuboid if the area of its base is 12 m^2 and its height equals 3 m.

8 How many cm^3 are enough to form a cuboid of dimensions 17 cm. , 13 cm. and 11 cm.?

9 A juice case is in the shape of cuboid, its base is square-shaped of side length 6 cm. and its height is 15 cm.
Calculate the volume of juice which fills the case completely.
(El-Menia 2017 , Port Said 2014)

10 Which is greater in volume , a cuboid of dimensions 70 cm. , 50 cm. and 30 cm. or a cuboid whose base area = 2 925 cm^2 and its height = 35 cm.? (El-Kalyoubia 2015)

11 A cuboid of dimensions 4 cm. , 5 cm. and 7 cm. and another cuboid in which the area of its base is 16 cm^2 and of height 9 cm.
Find the difference between their volumes.

12 A cuboid of volume 2 128 cm^3 and height 28 cm. Find its base area.

13 Find in cm. the height of the cuboid whose volume is 4.8 dm^3 and the area of its base is 240 cm^2

14 A cuboid whose volume is 8 000 cm^3 and the length of its base is 25 cm. and the width of its base is 16 cm. Find the height of the cuboid.

(El-Fayoum 2016)

15 8 100 cm^3 of water are poured in a cuboid-shaped vessel with a square base of side length 25 cm. Find the height of water in the vessel.

16 A cuboid is of volume 6 480 cm^3 , its height is 15 cm. and its width is 18 cm. Find the area of its base and its length. (Damietta 2014)

17 The volume of a cuboid is 2 128 cm^3 , its length is 19 cm. and its height is 14 cm. Calculate :

(a) The width of the cuboid.

(b) The base area of the cuboid. (Ismailia 2014)

18 A cuboid is of a square-shaped base whose perimeter is 20 cm. and its height is 7 cm. Calculate its volume. (El-Monofia 2017)

19 A builder used 1500 bricks for building up a wall. If each brick is in the shape of a cuboid of dimensions 25 , 12 and 6 centimetres.
Calculate the volume of the wall in m^3

(El-Beheira 2016)



20 A box is in the shape of a cuboid , its internal dimensions are 50 cm. , 40 cm. and 30 cm. How many blocks of soap can be put inside it to be full completely if the dimensions of each block of soap are 8 cm. , 5 cm. and 3 cm. ?

(El-Monofia 2016)



4
Lesson

21 A carton box is with internal dimensions 50 , 40 and 30 cm. It is wanted to fill it with boxes of tea in the shape of cuboids , the dimensions of each box are 10 cm. , 5 cm. and 6 cm. Calculate the greatest number of tea boxes can be put in that box.

(Luxor 2017)

22 Find the price of the sand which fills a bed of a truck in the shape of a cuboid , its inner dimensions are 2.5 m. , 1.6 m. and 0.7 m. knowing that the price of one m^3 of sand is L.E. 7.75



23 A truck for transporting goods, its dimensions are 3.2 , 1.5 and 2 metres. It is wanted to fill it with carton boxes for mineral water bottles to distribute it among the commercial shops. The dimensions of one carton box are 40 , 25 and 25 cm. Calculate :



(a) The greatest number of carton boxes that can be carried by the truck.

(b) The cost of transportation if the cost of transporting one carton is 0.75 pounds.

24 A lorry for transporting building materials , the internal dimensions of the container are 5 m. , 1.8 m. and 0.6 m. It is wanted to fill it completely by bricks of dimensions 25 cm. , 12 cm. and 6 cm. Calculate :



(a) The greatest number of bricks that can be put in the container of the lorry.

(b) The cost of transporting the bricks if the cost of transporting 1000 bricks is 35 pounds.

25 A rectangular playground is of dimensions 40 m. and 30 m. , we need 10 lorries to cover it with sand , if the inner dimensions of the lorry are 4 m. , 2 m. and 60 cm. , find :

(a) The volume of the needed sand.

(b) The thickness of the sand in the playground.

26 A cuboid-shaped container with dimensions 70 cm. , 50 cm. and 40 cm. is full of water. Water was poured into another container. If the height of water in the last container is 100 cm. Find the area of its base.

27 A container of volume 45 000 cm^3 is full of oil. Oil was poured into a cuboid-shaped container with a square base of side length 30 cm. Find the height of oil in the second container.

28 A cuboid-shaped swimming pool has a base of dimensions 60 m. and 25 m. and its height is 3 m.
Water was poured into the pool till its level reached 40 cm. from the brim of the pool.
Find the volume of water in m^3



29 A cuboid-shaped swimming pool is with a base of inner dimensions 30 m. and 12 m. and its height is 3 m.
It was partly filled with water.
If the volume of the water in the pool was 1 008 m^3
Find the height of the water in the pool and the volume of the water required to get the pool completely filled.



30 A swimming pool with internal dimensions 30 , 15 and 2 metres.
405 metres cube of water are poured into it.
Find :

(a) The height of water in the swimming pool.

(b) The volume of water which is needed to fill the swimming pool completely.



4
Lesson

31 Water is poured in a tank of water in the shape of a cuboid in which the dimensions of the base are 25 dm. and 12 dm. and its height is 16 dm. in the rate of 4.8 m^3 /hour. Find :

(a) The time needed for the tank to be filled with water.

(b) The height of water after quarter of an hour.

32 The height of a cuboid is 15 cm. and its rectangular-shaped base has a perimeter of 96 cm. and its length is 40 cm.
Calculate the volume of the cuboid.

33 The sum of all dimensions of a cuboid is 48 cm. and the ratio among its dimensions is 5 : 4 : 3
Find its volume. (Beni Suef 2015)

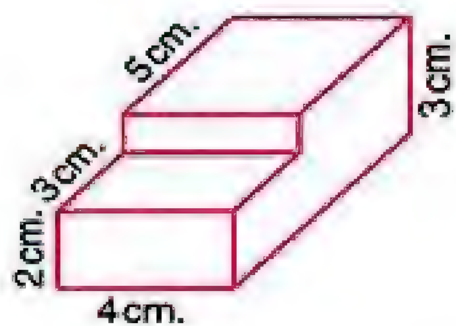
34 The sum of all edge lengths of a cuboid is 180 cm. and the ratio among its dimensions is 4 : 3 : 2
Find its volume.

35 The base of a cuboid is a square whose perimeter is 40 cm. and the ratio between the side length of its base and its height is 1 : 3
Find its volume.

36 The base of a cuboid is a rectangle whose perimeter = 40 cm. and the ratio between its length to its width = 3 : 2
Calculate its volume if its height is 10 cm. (Qena 2016)

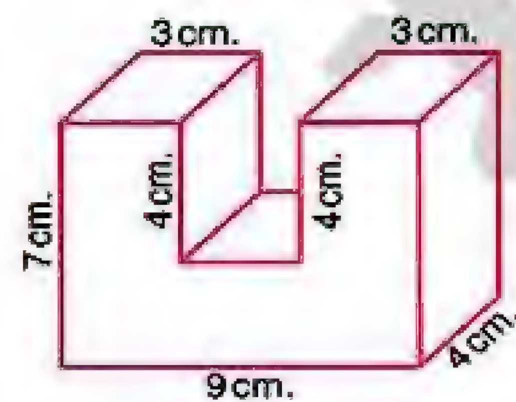
37 Find the volume of each of the following :

(a)



Volume = ... cm^3

(b)



Volume = ... cm^3



For Excellent Pupils

38 If the sum of the lengths of the edges of a cuboid = 40 cm. , its length = 3 cm. and its width = 2 cm. Calculate its volume.

39 Find the volume of a cuboid in which : its length + its width = 8 cm. , its width + its height = 7 cm. and its height + its length = 9 cm.

40 Find the possible dimensions of a cuboid whose volume is 48 cm^3 , if its base is square-shaped , such that all the dimensions are whole numbers.



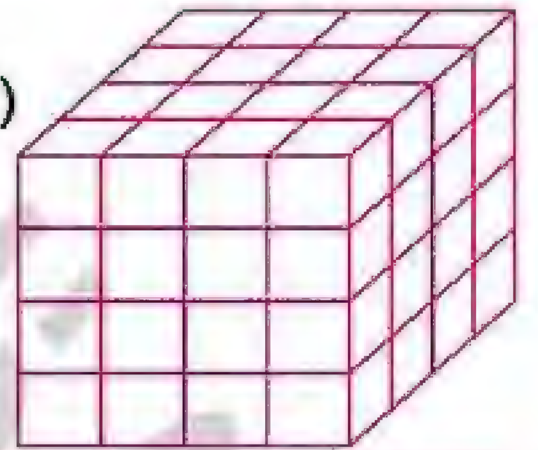
Lesson 5

Volume of the cube

Prelude

The opposite solid is a cuboid where its dimensions are equal in length (length = width = height) In this case , this solid is called a cube , then the cube is a special case of the cuboid when the length = the width = the height = edge length

i.e. The cube is a cuboid with equal dimensions.



Rule

The volume of the cube = the edge length × itself × itself = S × S × S

Example (1)

What is the volume of a cube of edge length 4 cm. ?

Solution

The volume of the cube = the edge length × itself × itself = $4 \times 4 \times 4 = 64$ cm^3

Example (2)

Find the volume of the cube if the perimeter of one of its faces is 28 cm.

Solution

We know that all faces of the cube are squares.

Then , the side length = $28 \div 4 = 7$ cm.

Then , the volume of the cube = $7 \times 7 \times 7 = 343$ cm^3

Example 3

The sum of lengths of all edges of a cube is 108 cm. Calculate its volume.

Solution

Since the cube has 12 edges equal in length

Then , the edge length = $\frac{108}{12}$ = 9 cm.

Then , the volume of the cube = 9 × 9 × 9 = 729 cm^3.

Example 4

The sum of areas of faces of a cube = 150 cm^2. Calculate its volume.

Solution

Since the cube has 6 congruent faces.

Then , the area of one face = $\frac{150}{6}$ = 25 cm^2.

Since the area of one face = the side length × itself.

Then , 25 = ? × ? *i.e.* 25 = 5 × 5

Then , the side length = 5 cm.

Then , the volume of the cube = 5 × 5 × 5 = 125 cm^3.

Try by yourself

[a] Find the volume of a cube of edge length 3 cm.

[b] The sum of areas of faces of a cube = 96 cm^2. Calculate its volume.

Example 5

Which is greater in volume : a cube of edge length 10 cm. or a cuboid of dimensions 15 cm. , 7 cm. and 10 cm. ?

Then find the difference between their volumes.

Solution

The volume of the cube = the edge length × itself × itself

= 10 × 10 × 10 = 1 000 cm^3.

The volume of the cuboid = length × width × height

= 15 × 7 × 10 = 1 050 cm^3.

The cuboid is greater in volume.

The difference between their volumes = 1 050 – 1 000 = 50 cm^3.

5 Lesson

Example 6

A metallic cube of edge length 12 cm. was melted and changed into a number of equal cuboids of dimensions 8 cm. , 2 cm. and 9 cm. each.
Find out the number of the cuboids.

Solution

The volume of the metallic cube = $12 \times 12 \times 12 = 1\ 728\ cm^3$.

The volume of each cuboid = $8 \times 2 \times 9 = 144\ cm^3$.

The number of cuboids = $\frac{1\ 728}{144}$ = 12 cuboids.

Example 7

A piece of metal is in the shape of a cube of edge length 9 cm. was melted to be a cuboid of length 12 cm. and width 9 cm.
Find the height of the cuboid.

Solution

The volume of the cube = the edge length × itself × itself

$= 9 \times 9 \times 9 = 729\ cm^3$.

The volume of the cuboid = the volume of the cube = $729\ cm^3$.

The base area of the cuboid = $12 \times 9 = 108\ cm^2$.

The height of the cuboid = $\frac{\text{its volume}}{\text{its base area}} = \frac{729}{108} = 6.75$ cm.

Try by yourself

A metallic cube is of edge length 9 cm. It is wanted to be melted and converted into ingots in the shape of cuboids , each of them has the dimensions 3 cm. , 3 cm. and 1 cm.
Calculate the number of ingots that are obtained.

Exercise 16 Volume of the cube


Solve Exercise

From the school book

1 Complete :

(a) The cube is a cuboid with .... dimensions. (El-Monofia 2013)

(b) If the dimensions of a cuboid are equal , then it is called a .... (South Sinai 2014)

(c) The volume of a cube = ... × .... × .... (Matrouh 2013)

(d) If the edge length of a cube is 3 cm. , then its volume is .... cm^3 (El-Fayoum 2016)

(e) The edge length of a cube is 0.6 dm. , then its volume is .... cm^3 (Souhag 2015)

(f) If the perimeter of one face of a cube is 8 cm. , then its volume = ... cm^3

(g) If the area of one face of a cube is 25 cm^2 , then its volume is .... cm^3

(h) The volume of the cube in which the sum of all its edge lengths is 36 = ... cm^3 (Damietta 2017 , Port Said 2015)

(i) The volume of the cube whose edge length equals the side length of a square of perimeter 16 cm. = ... cm^3

(j) If the total area of a cube = 24 cm^2 , then its volume = ... cm^3 (Cairo 2011)

(k) The volume of a cube whose base area is 9 cm^2 = ... cm^3 (Giza 2011)

2 Choose the correct answer :

(a) A cube is of edge length 4 cm. , then its volume = ... (Luxor 2014)
(16 cm^2 or 64 cm^2 or 16 cm^3 or 64 cm^3)

(b) The volume of the cube of edge length 0.1 dm. = ... cm^3
(El-Dakahlia 2015) (0.001 or 1000 or 1 or 10)

(c) If the perimeter of the base of a cube is 36 cm. , then its volume is .... cm^3 (El-Kalyoubia 2017) (36 or 6 or 729 or 216)

(d) If the area of one face of a cube = 1 cm^2 , then its volume = ...
(6 cm^3 or 4 cm^3 or 1 dm^3 or 1 cm^3)

(e) A cube , its volume is $\frac{1}{8}$ cm^3 , then the perimeter of one face = ... cm.
(El-Dakahlia 2017) ($\frac{1}{2}$ or 8 or 4 or 2)

(f) If the volume of a cube equals 125 cm^3 , then its base area equals ....
(Kafr El-Sheikh 2016) (35 cm^2 or 25 cm^2 or 15 cm^2 or 5 cm^2)

(g) The sum of the edge lengths of a cube with volume 1 cm^3 = ... cm.
(North Sinai 2013) (24 or 12 or 6 or 1)

(h) The sum of the edge lengths of a cube is 60 cm. , then the area of one face = ... cm^2 (100 or 20 or 25 or 125)

(i) If the sum of the lengths of five edges of a cube is 15 cm. , then its volume = ... (Qena 2016)
(125 cm^3 or 27 cm^3 or 45 cm^3 or 75 cm^3)

(j) The ratio between two edge lengths of the cube = ...
(1 : 4 or 1 : 1 or 4 : 1 or 1 : 12)

3 Complete the following table :

The cube				
The edge length (cm.)	The perimeter of the base (cm.)	The area of the base (cm^2)	The sum of lengths of all edges (cm.)	The volume (cm^3)
6	....	....	....	216
....	20	....	....	....
....	....	49	....	....
....	....	....	108	....

4 Find the volume of a cube with edge length 2 cm.

5 Find the volume of a cube with edge length 1.5 dm.

6 The perimeter of the base of a cube is 40 cm.
Calculate its volume. (Ismailia 2017 , El-Monofia 2015)

7 If the sum of lengths of all edges of a cube equals 132 cm.
Calculate its volume. (El-Sharkia 2017 , Damietta 2012)

8 Find the volume of the cube whose face area is 64 cm^2

9 Find the edge length of a cube whose volume is 125 cm^3 , then find the area of one of its faces. (Alexandria 2014)

10 Which is greater in volume ? a cuboid whose dimensions are 12 cm. , 10 cm. and 8 cm. or a cube of edge length 10 cm. (El-Fayoum 2015)

11 Which is greater in volume ? a cube of edge length 8 cm. or a cuboid with dimensions 5 cm. , 12.5 cm. and 8 cm.
What is the difference between their volumes ?

12 Which is greater ? The volume of a cuboid of base area 72 $m.^2$ and height 12 m. or the volume of a cube of face area 100 $m.^2$

13 Find the volume of the cube whose edge length is equal to the side length of an equilateral triangle of perimeter 30 cm.

14 A metallic cuboid , its dimensions are 4 cm. , 6 cm. and 9 cm. It is melted and converted into a cube. Find the edge length of the cube. (El-Sharkia 2013)

15 A cube of clay of edge length 8 cm. , cubes of edge length of each = 2 cm. are made of it. Find the number of these cubes. (Alexandria 2016)

16 A cube of cheese is of edge length 15 cm. It is wanted to be divided into small cubes , the edge length of each is 3 cm., for presenting them through meals. Calculate the number of the resulting small cubes. (El-Menia 2017 , Qena 2014)

17 A box made of carton in the shape of cuboid whose internal dimensions are 50 cm. , 40 cm. and 30 cm. , it is needed to fill it with cube-shaped bars of soap with edge length 10 cm. Find the number of bars.

18 A cube of metal its edge length equals 12 cm. needed to be melted down and converted into alloys in the form of a cuboid with dimensions 3 cm. , 4 cm. and 6 cm. Calculate the number of alloys that can be obtained. (Alexandria 2017)

19 A tin is in the shape of a cube , its internal edge length is 36 cm. , is filled with maize oil. We want to put it in small tins in the shape of cubes , its internal edge length is 9 cm.
Find the number of the small tins needed to do that. (El-Menia 2014)

20 A metallic cube is of edge length 36 cm., it is melted to be used in manufacture and it is converted into a cuboid in which the dimensions of the base are 48 cm. and 27 cm.
Calculate its height. (El-Gharbia 2015)

5 Lesson

21 A metallic piece is in the shape of a cube whose edge length is 6 cm. It is melted and converted into a cuboid with a square base of side length 4 cm. Find the height of the cuboid. (El-Kalyoubia 2014)

22 We have an amount of rice of volume 27 000 cm^3 It is wanted to be put in a carton box.
Show which of the following boxes is the more suitable and why :
(a) A cuboid with dimensions 45 , 40 and 12 cm.
(b) A cube whose internal edge length = 30 cm.

23 The sum of areas of all faces of a cube is 54 cm^2 Calculate its volume. (Cairo 2017 , Souhag 2016)

24 A commercial shop shows a cubic case with edge length 12 cm. , it is filled with honey. Calculate the amount of money that a person pays for buying 3 cases of honey if one cm^3 is sold for 0.05 pounds.

25 An empty cube-shaped bottle with internal edge length 6 cm. was filled with a type of scent. If the price of 1 cm^3 is P.T. 40
Find the price of the scent filling the bottle.

26 A box of carton is in the shape of a cube. Its external edge length is 30 cm. An antique made of glass is put inside it. And for protecting it from damage , the box is put inside another box of carton in the shape of a cube , its internal edge length is 36 cm. , the empty part between the two boxes is filled with sponge from all sides.
Calculate the volume of sponge.

27 Two containers are full of mango juice. The first is cuboid-shaped with inner dimensions 20 cm. , 25 cm. and 30 cm. , and the second is cube-shaped with internal edge length 30 cm. If the juice is put in bottles each one of volume 500 cm^3
Find the number of bottles that the juice can fill.

28 A cube-shaped basin whose edge length is 100 cm. , the water rushes inside it at a rate of 10 000 cm^3 per minute.
What is the time needed for the basin to be completely filled with water ?

29 A cube-shaped piece of metal , with edge length 18 cm. , was melted and reshaped into 216 small cubes.
Find the edge length of each small cube.

30 A vessel is filled completely with water , a metallic piece was thrown inside it , then we collected the falling water in a cubic vessel of internal edge length 3 cm. to fill it completely.
Find the volume of the metallic piece.

31 A cubic glass vessel , its inner edge length is 30 cm. This vessel contains an amount of water. If we throw a metallic piece in it then the water level raised 5 cm. because of that.
Find the volume of the metallic piece. (El-Beheira 2017 , El-Sharkia 2014)

32 An aquarium for fish is cube-shaped , it has a lid. The internal edge length of the aquarium is 35 cm. , the aquarium is made of glass.
Find the volume of the glass given that the thickness of the glass is 0.5 cm.



For Excellent Pupils

33 A cubic aquarium without a lid , its internal edge length is 20 cm.
If the aquarium is made of glass where the thickness of the glass is 0.75 cm.
Find the volume of the glass.



Lesson 6

Capacity

The capacity

It is the volume of the inner space of a hollow solid.

- The opposite figure shows a cube-shaped empty container of edge length 1 dm. (10 cm.) and a flask contains one litre of orange juice.
- When the juice is poured into the container, it becomes completely full.



Since ,

The volume of the container = 10 cm. × 10 cm. × 10 cm. = 1 000 cm^3

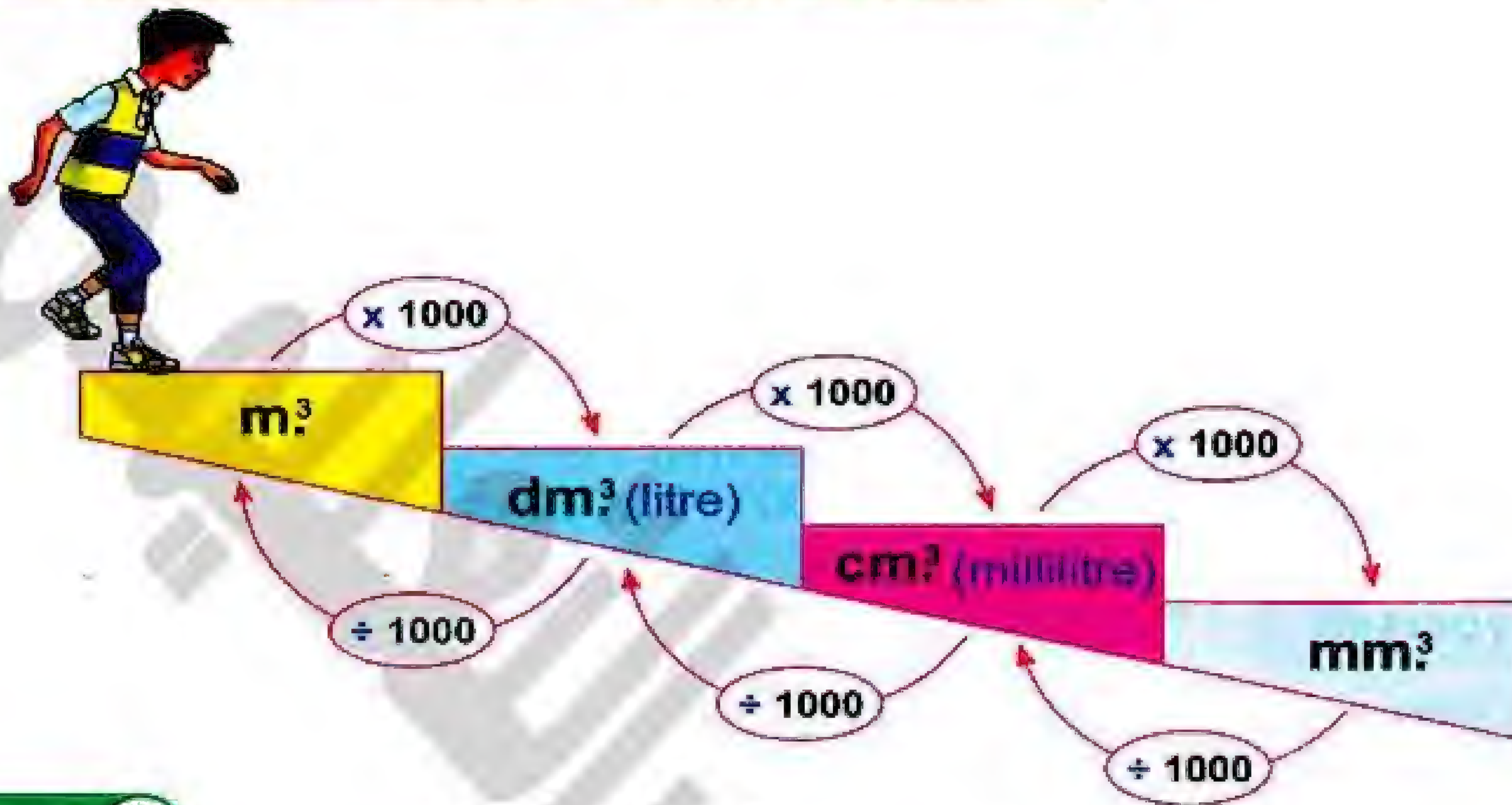
Then , 1 litre = 1 000 cm^3

Remarks

1. The litre (L.) and millilitre (mL.) are two units for measuring capacity or the volume of liquids.
2. 1 millilitre = 1 cm^3 and 1 litre = 1 dm^3

   So , 1 litre = 1 000 millilitres

The relation between the units of volume



Example 1

Convert each of the following into litres :

[a] 6 500 cm^3 [b] 0.46 m^3 [c] 7.64 dm^3 [d] 750 mL.

Solution

[a] 6 500 cm^3 = 6 500 ÷ 1 000 = 6.5 litres.

[b] 0.46 m^3 = 0.46 × 1 000 = 460 litres.

[c] 7.64 dm^3 = 7.64 litres.

[d] 750 mL. = 750 ÷ 1 000 = 0.75 litres.

Example 2

Convert each of the following into cubic centimetres :

[a] 0.006 m^3 [b] 3.25 litres [c] 5 700 mm^3 [d] 2.5 mL.

Solution

[a] 0.006 m^3 = 0.006 × 1 000 000 = 6 000 cm^3

[b] 3.25 litres = 3.25 × 1 000 = 3 250 cm^3

[c] 5 700 mm^3 = 5 700 ÷ 1 000 = 5.7 cm^3

[d] 2.5 mL. = 2.5 cm^3

6
Lesson

Example 3

Convert each of the following into cubic metres :

[a] 56 dm^3 [b] 84 000 cm^3 [c] 6.9 litres.

Solution

[a] 56 dm^3 = 56 ÷ 1 000 = 0.056 m^3

[b] 84 000 cm^3 = 84 000 ÷ 1 000 000 = 0.084 m^3

[c] 6.9 litres = 6.9 dm^3 = 6.9 ÷ 1 000 = 0.0069 m^3

Try by yourself

Complete :

[a] 3.7 litres = ... cm^3

[b] 5.4 dm^3 = ... L.

[c] 1 200 cm^3 = ... litres.

[d] 1.2 m^3 = ... mL.

Example 4

A cuboid-shaped container of inner dimensions 25 cm. , 32 cm. and 17 cm. was filled with oil.

Find the number of bottles needed to be filled up with that oil if the capacity of each bottle is 0.4 litre.



Solution

The capacity of the container = 25 × 32 × 17 = 13 600 cm^3

The capacity of each bottle = 0.4 litre.

= 0.4 × 1 000 = 400 cm^3

The number of bottles = $\frac{\text{capacity of the container}}{\text{capacity of each bottle}} = \frac{13\,600}{400}$ = 34 bottles.

Example 5

6.5 litres of mango juice is poured in a cuboid-shaped container with a base of dimensions 26 cm. and 50 cm.

Find the height of the juice in the container.



Solution

The volume of mango juice = 6.5 × 1 000 = 6 500 cm^3

The height of the juice = $\frac{\text{the volume of the juice}}{\text{the base area of the container}} = \frac{6\,500}{26 \times 50}$

= 5 cm.

Example 6

A cuboid-shaped tin with inner dimensions 40 cm. , 20 cm. and 25 cm. is completely filled with oil.

Calculate the price of oil if the price of one litre is L.E. 4

Solution

The volume of the cuboid = L × W × H

= 40 × 20 × 25 = 20 000 cm^3

The capacity of the tin = 20 000 ÷ 1 000 = 20 litres.

The price of the oil = 4 × 20 = L.E. 80

Example 7

A cuboid-shaped box without a lid has a base of outer dimensions 62 cm. and 52 cm. and its outer height is 31 cm. If the thickness of the material which the box was made of is 1 cm.

Find the capacity of the box in litres.

Solution

The inner dimensions :

L = 62 – 2 = 60 cm.

W = 52 – 2 = 50 cm.

H = 31 – 1 = 30 cm.

The capacity of the box

= 60 × 50 × 30 = 90 000 cm^3

= 90 000 ÷ 1 000 = 90 litres.

Notice that :

To find the inner dimensions :
- We must subtract 2 from L and W (because the thickness = 1 cm.)
- We must subtract 1 from H (because the box is without a lid)



Exercise 17 Capacity



From the school book

1 Write the common suitable unit from the units (m^3, litre, mL.) : to measure the following :

(a) The capacity of a water tank on the roof of a house. (..................)
(b) The volume of a cereals container. (..................)
(c) The capacity of an oil bottle. (..................)
(d) The volume of an amount of medicine in a syringe. (..................)
(e) The capacity of a swimming pool in a sports club. (..................)
(f) The capacity of a milk carton. (..................)

2 Convert each of the following into cubic centimetres :

(a) 370 dm^3 | (b) 0.007 m^3 | (c) 8.25 litres.
(d) 8 700 mm^3 | (e) 4.4 millilitres. | (f) 80 millilitres.

3 Convert each of the following into cubic metres :

(a) 640 000 cm^3 | (b) 6 810 dm^3 | (c) 33.67 litres.
(d) 356.4 dm^3 | (e) 459.4 litres. | (f) 4 500 000 mL.

4 Convert each of the following into litres :

(a) 550 000 cm^3 | (b) 539 cm^3 | (c) 631.7 cm^3
(d) 9.18 m^3 | (e) 47.9 dm^3 | (f) 5 500 mL.

5 Complete :

(a) The capacity is .... (El-Dakahlia 2017 , El-Dakahlia 2015)
(b) 4.6 litres = ... millilitres (Alexandria 2012)
(c) 4.63 litres = ... cm^3 (Alexandria 2016)
(d) 7 m^3 = ... litres
(e) 0.5 cm^3 = ... mm^3
(f) 7 300 mL. = ... dm^3
(g) 2 000 cm^3 = ... litres (Giza 2014)
(h) 5.6 dm^3 = ... mL. (El-Monofia 2011)
(i) 930 mL. = ... litres



(j) 7 cm^3 = ... mL. (Souhag 2016)

(k) 1.5 m^3 = ... mm^3

(l) The volumes 100 cm^3 , 10 litres and 1 m^3 are arranged in .... order. (Damietta 2015)

(m) 3.45 litres + 0.5 dm^3 + 50 cm^3 = ... litres. (Damietta 2013)

(n) The volume of the inner space of a container is 16 000 cm^3 , then the capacity of this container = ... litres.

(o) The capacity of a tin is 4 litres , then the inner volume of this tin = ... dm^3

(p) The inner edge length of a cube-shaped box is 60 cm. , then the capacity of this box = ... litres.

(q) If the capacity of a vessel on the shape of a cube internally equals $\frac{1}{8}$ litre , then the edge length of the cube = ... cm. (Damietta 2014)

(r) A case in the shape of a cube , its external volume = 1 000 cm^3 and capacity = 729 cm^3 , then the volume of the material that the case is made of = ... cm^3

---

6 **Choose the correct answer between brackets :**

(a) The litre is a unit for measuring .... (Aswan 2012)
(length *or* distance *or* capacity *or* time)

(b) 1 litre = ... millilitres. (Suez 2012) (10 *or* 100 *or* 1 000 *or* 10 000)

(c) 5.3 litres = ... dm^3 (5 300 *or* 0.0053 *or* 53 *or* 5.3)

(d) 38 millilitres = ... cm^3 (Damietta 2011)
(38 000 *or* 3 800 *or* 380 *or* 38)

(e) 0.0003 litre = ... mm^3 (3 *or* 0.3 *or* 300 *or* 0.003)

(f) $2\frac{1}{2}$ litres = ... (0.25 m^3 *or* 2.5 cm^3 *or* 25 dm^3 *or* 2 500 cm^3)

(g) 20 dm^3 = ... ($\frac{1}{50}$ litre *or* 20 litres *or* $\frac{1}{5}$ litre *or* 5 litres)

6 Lesson

(h) $0.85\ m^3$ = ... (85 litres or 8 500 cm^3 or 85 cm^3 or 850 dm^3)

(i) $\frac{3}{4}$ litre = ... (Beni Suef 2015)

(75 mL. or 750 cm^3 or 75 dm^3 or 0.075 m^3)

(j) 1.45 litre + 0.5 dm^3 = ... litre (Cairo 2014)

(1.5 or 1.95 or 1.545 or 1.59)

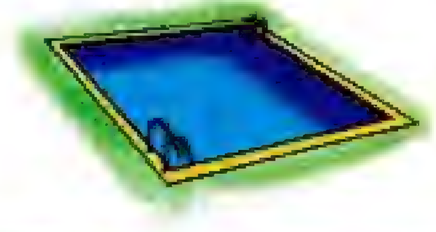
(k) 75 % litre + 25 % dm^3 = ... (El-Dakahlia 2017)

(10 litres or 1000 cm^3 or 100 dm^3 or 100 cm^3)

7 A cubic pot , the length of its interior edge equals 20 cm. , filled with black honey. Calculate the capacity of this pot in litres. (Aswan 2013)

8 A cuboid-shaped tin with square base of inner side length 30 cm. contains juice , if the height of the juice in the tin is 50 cm.
Find the volume of the juice in litres.

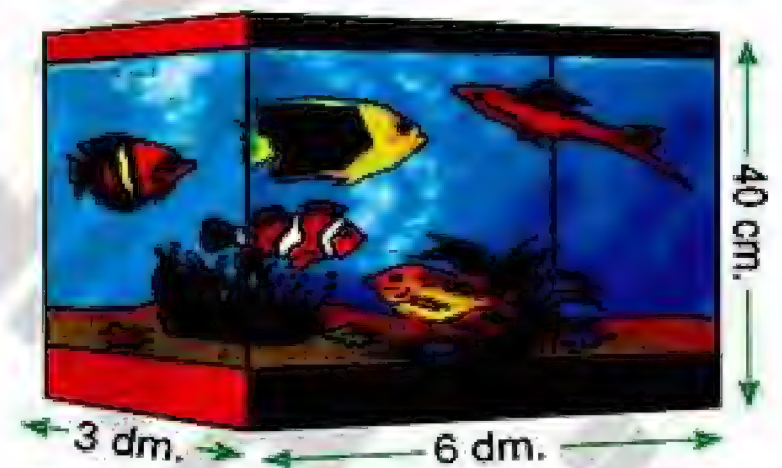
9 A swimming pool is in the shape of a cuboid whose internal dimensions are 40 m. , 30 m. and 1.8 m.
Find its capacity in litres. (Giza 2017)



10 The opposite figure represents a cuboid-shaped aquarium.
Use the given internal dimensions to calculate its capacity in :

(a) millilitres.

(b) litres.



11 Two vessels , one is in the shape of a cube with inner edge length 0.4 m. and the other is in the shape of a cuboid with inner dimensions 50 cm. , 60 cm. and 30 cm.
Find the difference between the two capacities of the two vessels in millilitres.

12 If 500 cm^3 of a certain medicine are packed in small bottles and the capacity of each bottle is 25 mL.
Find the number of the needed bottles.



13 The internal dimensions of a cuboid-shaped vessel are 75 cm. , 40 cm. and 150 cm. This vessel is filled with oil , the oil is put in bottles. If each bottle contains 1.5 litre. Find the number of the needed bottles.



14 The capacity of a bottle is $\frac{3}{4}$ litre. It is filled with alcohol. We want to put this amount of alcohol in small bottles which the capacity of each of them is 25 cm^3.
Find the number of the small bottles. (Port Said 2015)

15 A container has 12 litres of honey. It is wanted to put them in smaller vessels (bottles) the capacity of each of them is 400 cm^3.
Calculate the number of bottles which are needed for that. (Cairo 2016)

16 A patient takes a spoon of medicine of capacity 3 mL. daily in the morning and in the evening.
After how many days does the patient take 240 cm^3 from this medicine ?



17 Two containers are full of mango juice. The first is a cuboid-shaped with dimensions 30 , 25 and 32 cm. and the second is cube-shaped with edge 40 cm. long. If the juice is to be put in bottles each of capacity 0.8 litre.
Find the number of bottles that can be filled.



18 If the capacity of a tank in the shape of a cuboid is 72 000 litres , find the area of the base if the height is 4 m. (Alexandria 2014)

19 A tank of water is in the shape of a cuboid in which the dimensions of the base are 50 cm. and 40 cm.
If 20 litres of water are poured into it.
Find the height of the water in the tank. (El-Monofia 2015)

20 10 litres of water are poured in a vessel in the shape of a cuboid , its base is a square of side length 25 cm.
Find the height of the water in the vessel. (El-Gharbia 2017 , Red Sea 2015)

21 56 litres of molasses are put in 25 tins of the same kind , each has a rectangular-shaped base with dimensions 16 cm. and 10 cm. Find the height of the molasses in each tin.

---

22 A container is in the shape of a cuboid , its height is 40 cm. and its base is square-shaped of perimeter = 60 cm. Find its capacity in litres. (Alexandria 2011)

---

23 A cuboid-shaped water tank with inner dimensions 250 cm. long , 200 cm. wide and 360 cm. high. Water is poured to fill one third of its capacity. Calculate the volume of the empty part of the tank.

If the tank is completely filled with water , find its capacity in litres.



---

24 A cube-shaped vessel , its internal edge length is 30 cm. It is filled with cooking oil :

(a) Calculate the capacity of the vessel.

(b) If the price of one litre of the cooking oil is 9.5 pounds , calculate the price of all the cooking oil. (Alexandria 2017 , Assiut 2013)

---

25 A tin is in the shape of a cuboid , its internal dimensions are 10 cm. , 20 cm. and 30 cm. It is filled with honey , if the price of one litre of honey is L.E. 25 Find the price of the honey in the tin. (South Sinai 2016)

---

26 The height of a cuboid-shaped water tank is 3 metres and the perimeter of its base is 8 metres and the ratio between its base dimensions is 3 : 5 Find the capacity of the tank in litres.

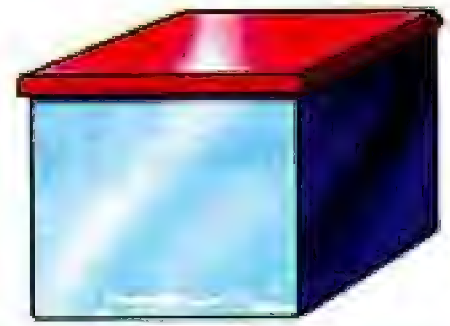
27 A container is in the shape of a cuboid , its internal dimensions are :
The length = 30 cm. , the width = 25 cm. and the height = 42 cm.
An amount of solar is put in it , its height = $\frac{1}{3}$ the height of the container.

Calculate :

(a) The volume of solar in the container. (Damietta 2015)

(b) The total price of solar in the container if the price of one litre of solar = 1.2 pounds.

28 A box for preserving food stuff in the shape of a cube whose external edge length = 52 cm. is made of a material of thickness 1 cm.
Find the capacity of the box.



29 Width 68 cm. , length 72 cm. and height 58 cm. are the outer dimensions of a box without a lid used for storing food.
It is made of a material of 2 cm. thickness.
Find the capacity of the box in litres to the nearest hundredth.



For Excellent Pupils

30 A cuboid-shaped water tank has inner dimensions 2.5 m. long , 160 cm. wide and 14 dm. high. Water is poured in the tank at a rate of 2 800 litres per hour. Find :

(a) The height of the water in the tank after half an hour.

(b) The time needed for the tank to be filled.





Test on Unit Three

Answer the following questions :

1 Choose the correct answer :

(a) If the sum of the edge lengths of a cube equals 36 cm. , then its volume equals .... cm^3. (729 *or* 1 728 *or* 27 *or* 216)

(b) 4.6 litres = ... millilitres. (4.6 *or* 46 *or* 460 *or* 4600)

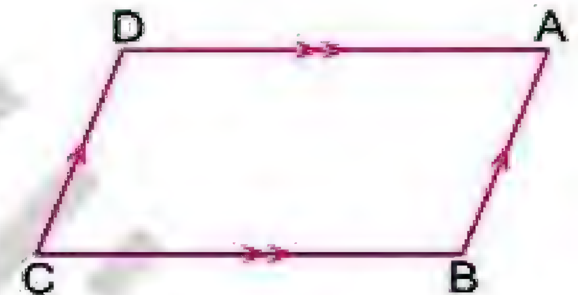
(c) If one angle in a parallelogram is right , then it is called a .... (rhombus *or* trapezium *or* triangle *or* rectangle)

(d) The volume of a cuboid equals 315 cm^3 and its base is with length 9 cm. and width 7 cm. , then its height = ... cm. (7 *or* 5 *or* 63 *or* 45)

(e) **In the opposite figure :**

ABCD is a parallelogram

, then m (∠ A) + m (∠ B) = ...



(90° *or* 180° *or* 360° *or* 108°)

2 Complete each of the following :

(a) .... (in the same pattern)

(b) The number of edges of the cuboid is .... and the number of vertices of the cube is ....

(c) The volume of a cuboid is 120 cm^3 and its height is 4 cm. , then the area of its base is .... cm^2.

(d) If the volume of a cube = 8 cm^3 , then its edge length = ... cm.

(e) 1.45 litres + 0.5 dm^3 + 50 cm^3 = ... litres.

3 **(a)** A box is made of carton in the shape of a cuboid whose internal dimensions are 50 cm. , 40 cm. and 30 cm. It is needed to fill it with cube-shaped bars of soap with edge length 10 cm. Find the number of bars.

(b) A vessel in the shape of a cube with edge length 15 cm. is filled with honey.

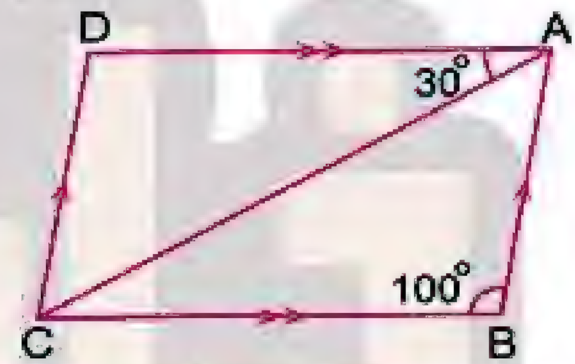
(1) Calculate the capacity of the vessel.

(2) If the price of one litre is L.E. 8 , calculate the price of the honey.

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4 **(a)** The sum of all dimensions of a cuboid is 70 cm. and the ratio among its dimensions is 2 : 5 : 7 Find its volume.

(b) In the opposite figure :



ABCD is a parallelogram in which :

m (∠ B) = 100° , m (∠ CAD) = 30°

Find : (1) m (∠ D) **(2)** m (∠ BAC)

(3) m (∠ ACD)

---

5 **(a)** 1 183 cm^3 of water are poured in a cuboid-shaped vessel with a square base of side length 13 cm.

Find the height of water in the vessel.

(b) The sum of areas of all faces of a cube is 150 cm^2.
Calculate its volume.





Statistics

UNIT FOUR



Lessons of the unit :

1. Kinds of statistical data.
2. Collecting the descriptive statistic data.
3. Collecting the quantitative statistic data.
4. Representing the statistic data by the frequency curve.

⊙ **Unit test.**



Lesson 1

Kinds of statistical data

Statistics is one of the applied mathematics branches that take care of collecting , organizing , representing and analysing data.

i.e. Data is the main input in many daily life situations such as the following form which is to be filled by the applicants for a certain job.



Read and notice

Application form

Name : .... Date of birth : ....
Address : .... Age : ....
Qualifications : ....
University : ....
Year of graduation : ....
Gender : .... Military status : ....
Marital status : .... Expected salary : ....
Weight : .... Height : ....
Hobbies : .... e-mail : ....
Telephone number : ....

Personal photo

1 Lesson

You notice that the responses of this survey contains two kinds of data :

1. Descriptive data : These are data written in the form of discription of the case of the persons in the society as : name , qualification , gender , marital status , ...

2. Quantitative data : These are data written in the form of numbers to express a certain phenomenon as : age , weight , height , ...

Example 1

The opposite form is designed to be filled by the participants of one of the school activity groups.
Read it well , then answer :

[a] What are the descriptive data ?
[b] What are the quantitative data ?
[c] Fill in this form with your personal data.

School activity group
Participation form
Name : .... Stage : ....
Grade : .... Age : ....
Date of birth : ....
Address : ....
e-mail : ....
Telephone number : ....
Hobbies : ....

Solution

[a] Name , stage , grade , address , e-mail and hobbies.
[b] Age , date of birth and telephone number.
[c] Do by yourself.

Remark

The data requisition sheet is a sheet contains a set of data , some of them is descriptive and the other is quantitative belong to a certain person or a thing.

Example 2

A company wanted to make data base for its employees , so it designed the following form :

No.	Name	Age	Address	Tel. No.	Qualification	Job	Salary
1	....	....	....	....	....	....	....
2	....	....	....	....	....	....	....
3	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....

Read the previous table , then answer :

[a] Which column contains descriptive data ?

[b] Which column contains quantitative data ?

[c] Draw two more columns, one contains descriptive data and the other contains quantitative data.

Solution

[a] The columns of : Name , address , qualification and job.

[b] The columns of : No. , age , telephone number and salary.

[c] Do by yourself.

Remark

Data base is some quantitative and descriptive data of number of persons or establishments.

Try by yourself

A company is about to increase its production of toilet soap of different scents , so it applied the following survey to the visitors of one market.

Survey

Day : ....

Date : ....

- Name : ....
- Address : .... Gender : ....
- No. of family members : ....
- The favourite scents : ....
- ....
- ....

[a] Mention the descriptive data.

[b] Mention the quantitative data.

[c] Add two more items to the survey such that one of them requires quantitative data and the other requires descriptive data.

Exercise 18 Kinds of statistical data


Solve Exercise

From the school book

1 Complete :

(a) The kinds of statistic data are .... and .... (Suez 2016)

(b) The birth place is .... data. (Aswan 2011)

(c) The age is .... data.

(d) The blood type is .... data.

(e) The length is .... data. (Aswan 2012)

2 Choose the correct answer :

(a) .... is one of the descriptive data.

(The weight *or* The mark of student *or* The favourite colour *or* The tallness)

(b) From the quantitative data is the .... (El-Kalyoubia 2016)

(favourite colour *or* birth place *or* blood type *or* age)

(c) The following data are descriptive except the .... (Giza 2011)

(favourite food *or* social case *or* birth place *or* weight)

(d) The following data are quantitative except the .... (Giza 2013)

(temperature degree *or* tallness *or* address *or* weight)

(e) All the following data are descriptive except .... (El-Sharkia 2017)

(the favorite colour *or* birth place *or* blood species *or* age)

(f) The following data are quantitative except .... (Port Said 2017 , El-Beheira 2015)

(age *or* length *or* weight *or* the favourite colour)

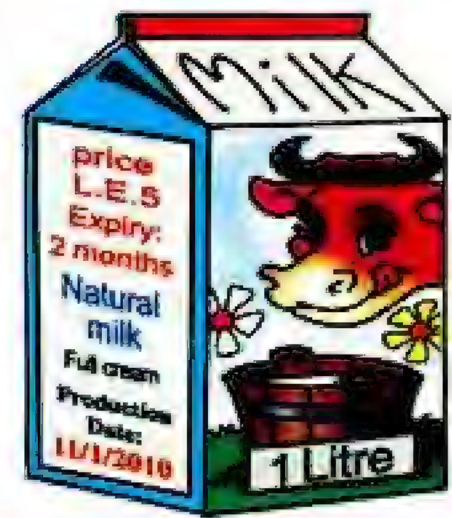
3 Read the data on the opposite juice bottle , then complete :



(a) The descriptive data are : ....

(b) The quantitative data are : ....

4 Read the data on the box of milk , then classify the data registered on it into descriptive data and quantitative data.



5 The opposite card is a membership card of a sports club.

(a) What are the quantitative data ?

(b) What are the descriptive data ?

Youth Club
Personal photo
Name : ....
Age : ....
Sport : ....
Membership No. : ....

6 The opposite figure shows a model sheet of one of personal cards of a pupil in a school. Look at it well , then :

(a) Extract from it the descriptive and the quantitative data.

(b) Write your own personal data on this sheet.

A personal card of pupil
School : ....
Name : ....
Grade : ....
Address : ....
Class : ....
School year : ....
Birthday : ..... / ..... / 20 .....
Blood type : ....
Tel. No. : • Home .... • Mob. : ....
Personal photo

7 The following data base form is for the data of the workers of a factory :

No.	Name	Qualification	Age	Hiring date	Neighbourhood	Tel. No.
1						
2						
3						
4						

Determine the columns that represent descriptive data and the columns that represent quantitative data.



Lesson 2
Collecting the descriptive statistic data

Survey

What sport do you like most ? (Plot your answer)

☐ Football  ☐ Volleyball  ☐ Handball 

☐ Aerobics  ☐ Basketball  ☐ Judo 

Mr. Edward applied the previous survey to 40 pupils of a class to know their favourite sports.

Their responses were as the following :

Football - Judo - Handball - Volleyball - Football - Basketball - Judo
Aerobics - Volleyball - Aerobics - Handball - Handball - Basketball - Football
Judo - Basketball - Football - Volleyball - Aerobics - Handball - Football
Football - Handball - Football - Judo - Basketball - Volleyball - Basketball
Football - Football - Volleyball - Handball - Football - Judo - Handball
Football - Volleyball - Judo - Handball - Volleyball

You notice that the previous descriptive data in this unarranged form can't help us to take any decision or to get any information, so we have to tabulate this data in a tally frequency table as we studied in the last year as follows :

Sport	Tally (strokes)	No. of pupils (frequency)
Football	~~////~~ ~~////~~ /	11
Volleyball	~~////~~ //	7
Handball	~~////~~ ///	8
Aerobics	///	3
Basketball	~~////~~	5
Judo	~~////~~ /	6
Total		**40**

Omitting the tally column, we get the following distribution frequency table :

Sport	Football	Volleyball	Handball	Aerobics	Basketball	Judo	Total
No. of pupils (frequency)	11	7	8	3	5	6	**40**

We notice that : the number in the frequency cell refers to the repetition of one item (one sport in our example), therefore we call this table a simple frequency table.

Using the previous simple frequency table, we can get the following information :

- The most popular sport is football ($\frac{11}{40} \times 100\ \% = 27.5\ \%$)
- The least popular sport is aerobics ($\frac{3}{40} \times 100\ \% = 7.5\ \%$)

and there is many other information we can get from this table.

Example



Youssef was waiting for his school bus, then he decided to record the colours of the first 30 cars passing in front of him which were as follows :

white - green - red - red - blue - black - red - white - blue - black - blue - white - red - black - blue - green - white - blue - red - black - white - blue - white - red - green - white - red - white - black - silver

2
Lesson

• Form the simple frequency table for this data , then answer the following questions :

[a] What is the most common colour in this neighbourhood and what is its percentage ?

[b] What is the least common colour in this neighbourhood and what is its percentage ?

Solution

• We form the tally frequency table :

Colour	Tally	Frequency
White	𝍸 ///	8
Blue	𝍸 /	6
Green	///	3
Black	𝍸	5
Red	𝍸 //	7
Silver	/	1
Total		**30**

• We omit the tally column to get the simple frequency table :

Colour	White	Blue	Green	Black	Red	Silver	**Total**
Frequency	8	6	3	5	7	1	**30**

[a] The most common colour is white and its percentage is $\frac{8}{30} \times 100\ \% = 26\frac{2}{3}\ \%$

[b] The least common colour is silver and its percentage is $\frac{1}{30} \times 100\ \% = 3\frac{1}{3}\ \%$

Try by yourself

To form the class representatives committee , 5 students (Ramy, Sameh, Mazen, Fareed and Samir) are nominated as candidates and the rest of the class will vote to elect the class leader , their votes are as follows :

Ramy - Sameh - Ramy - Fareed - Samir - Mazen - Sameh - Fareed - Sameh - Sameh - Mazen - Ramy - Sameh - Ramy - Samir - Mazen - Ramy - Fareed - Mazen - Fareed - Ramy - Ramy - Mazen - Samir - Mazen

• Record this data in the following tally frequency table :

Student	Tally	Frequency
Ramy	....	....
....	....	....
....	....	....
....	....	....
....	....	....
Total		....

• Who is the class leader ?

• What is his percentage ?





Exercise 19 Collecting the descriptive statistic data


Solve Exercise

From the school book

1 The following table shows the fruit production in tons by a farm in a year :

Fruit	Mango	Apple	Orange	Banana	Watermelon	Total
No. of tons	12	8	16	10	14	60



(a) What is the fruit that has the greatest production and what is the percentage of it ?

(b) What is the fruit that has the least production and what is the percentage of it ?

(c) How many kg. of watermelon are produced ? And if we arrange the fruits according to the produced amount of each kind descendingly , what will be the order of watermelon ?

(d) How many tons of banana are produced and what is the percentage of it ?

2 The following table shows the distribution of the numbers of the foreign tourists in millions who visited Egypt in 2009 due to their nationalities :

Nationality	French	German	British	Russian	Italian	Total
No. of tourists in millions	0.8	1.2	1.34	2.35	1.04	6.73



(a) What is the country from which the most tourists visited Egypt ? What is their percentage ?

(b) What is the country from which the least tourists visited Egypt ? How many tourists from this country visited Egypt ?

(c) What is the number of German tourists ? What is their percentage ?

3 A teacher asked the students of his class (20 students) to choose among 4 places (Zoo - Pyramids - Egyptian Museum - Cairo Tower) to go on a trip and their choices were as follows :



Pyramids - Zoo - Pyramids - Cairo Tower -
Zoo - Egyptian Museum - Zoo -
Egyptian Museum - Pyramids - Pyramids -
Zoo - Pyramids - Egyptian Museum -
Zoo - Egyptian Museum - Cairo Tower -
Pyramids - Pyramids - Cairo Tower - Pyramids

- Form the simple frequency table of this data.
- Which place is the most popular ?

---

4 If the general evaluations of 40 students in Arabic language in a university are as follows :

V.good - Good - Pass - Good - Excellent -
Good - Good - V.good - Good - V.good -
Pass - Good - Good - Excellent - V.good -
Excellent - Excellent - Pass - Good - V.good -
Good - V.good - Good - Pass - V.good -
V.good - Good - V.good - Pass - Good -
V.good - Good - Pass - V.good - Excellent -
Pass - Pass - Excellent - Good - Pass

- Form the tally frequency table, then form the frequency table for the previous results, then answer the following questions :
  - What is the most common evaluation of the students ?
  - What is the least common evaluation of the students ?
  - What is your advice to the students in this important educational stage ?

---

5 The following are the results of a survey made by one of the schools about the books which the pupils borrow from the library during a month. By checking 50 of the borrowed cards in different branches, this kinds of





books were as the following :
Philosophy - Sociology - Science - Literature - Science - Languages - Literature - Sociology - Stories - Science - Literature - Languages - Stories - Literature - Sociology - Philosophy - Sociology - Stories - Arts - Languages - Science - Literature - Literature - Science - Literature - Arts - Science - Stories - Literature - Science - Arts - Science - Stories - Literature - Philosophy - Sociology - Sociology - Stories - Languages - Literature - Sociology - Stories - Stories - Science - Sociology - Languages - Science - Literature - Philosophy - Sociology.

(a) Form the tally frequency table.
(b) Form the simple frequency table.
(c) What kind of books do the pupils most prefer ? And what is the percentage of their number to the total number of borrowed books ?
(d) What kind of books do the pupils least prefer ? And what is the percentage of their number to the total number of borrowed books ?
(e) How many science books are borrowed ? And what is the percentage of their number to the total number of borrowed books ?

---

6 A sample of 33 tourists is taken from one of the touristic groups coming to Luxor in one day in winter and their nationalities were as follows :



Russian - American - British - Italian - French - American - British - Russian - French - American - Italian - Russian - American - French - Italian - British - Russian - Italian - Italian - Russian - American - Italian - French - Russian - Russian - American - Italian - British - Russian - British - Italian - Russian - American

Form the simple frequency table for the previous descriptive data, then answer the following questions :

(a) Which nationality has the greatest number of tourists in this group ? Express that by a percentage.

(b) Which nationality has the smallest number of tourists in this group ? Express that by a percentage.

(c) What is your advice to the people in charge of tourism in Luxor ?

7 A company for producing chips applied a survey to 40 persons to choose their favourite flavor , so their responses were as follows :



Tomato - Cheese - Shrimp - Shrimp - Salt - Spices - Tomato - Spices - Salt - Cheese - Spices - Spices - Salt - Cheese - Shrimp - Salt - Spices - Salt - Cheese - Shrimp - Tomato - Shrimp - Spices - Salt - Cheese - Shrimp - Salt - Salt - Spices - Shrimp - Cheese - Shrimp - Salt - Tomato - Tomato - Cheese - Spices - Salt - Salt - Shrimp.

Form the simple frequency table for this data.

(a) What flavor is the most prefered ? And what is its percentage ?

(b) Put the other different flavors in a descending order according to the number of persons who choose each one.



Lesson 3

Collecting the quantitative statistic data

Collecting quantitative data needs using one of two types of frequency tables , the following two examples illustrate each of them :

Example 1

The following data shows the marks of 30 pupils of 6th primary grade in maths where the maximum mark is 10 marks :

8	7	7	7	5	4	8	6	6	5
5	6	6	7	7	9	7	6	7	7
6	7	7	8	5	6	8	9	4	8

From these unarranged data, is it easy to answer questions as :

- What is the mark that most of pupils got ?
- How many pupils got 7 marks ?
- How many pupils got 3 or 4 marks ?

No doubt that we can't answer questions as the previous ones using the given marks in this scattered form easily, for that we will make a simple frequency table as the following :

Marks	Tally	Frequency
4	//	2
5	////	4
6	~~////~~ //	7
7	~~////~~ ~~////~~	10
8	~~////~~	5
9	//	2
Total		30

Marks	4	5	6	7	8	9	Total
Frequency	2	4	7	10	5	2	30

The previous table helps us to answer any questions about the level of pupils or their order according to the marks they got.

Example 2

The following data shows the daily wages of 80 workers in a factory :

44	54	48	37	79	66	69	51	37	70
88	65	20	39	83	62	55	50	54	57
89	73	57	33	23	66	54	54	60	43
37	23	56	78	33	41	41	42	58	51
83	49	26	34	44	44	61	65	70	21
48	31	45	49	52	55	66	75	38	49
50	52	57	47	43	53	56	63	67	78
87	27	46	51	56	68	43	47	51	37

We notice that there is a large number of different wages, for that it is unreasonable to record these data in a simple frequency table, so we need a new type of frequency tables by using suitable sets (intervals) of wages instead of using each wage individually as follows :

[1] Determine the minimum wage which is L.E. 20, the maximum wage which is L.E. 89 and the difference between them which is : 89 – 20 = L.E. 69

This difference between the maximum and the minimum wage is called the range.

3 Lesson

[2] Since the range is L.E. 69, therefore it is suitable to distribute the wages in 7 sets (intervals), the length of each is L.E. 10 getting the following sets :

The first set : that contains workers whose wages are more than or equal to L.E. 20 and less than L.E. 30 which is written as (20 –)

The second set : that contains workers whose wages are more than or equal to L.E. 30 and less than L.E. 40 which is written as (30 –)

The third set : that contains workers whose wages are more than or equal to L.E. 40 and less than L.E. 50 which is written as (40 –)

and so on until we reach to the seventh set that contains workers who got more than or equal to L.E. 80 and less than L.E. 90 which is written as (80 –)

[3] We write the previous sets in the 1^{st} column of the frequency table.

[4] For each wage of the given workers wages, we put a stroke " / " in front of the set containing this wage in the second column.

[5] After recording all the wages in the 2^{nd} (Tally) column, we write the frequency column.

We get the following frequency table which is called "Frequency table of sets" because the given data are distributed into sets.

Sets of wages	Tally (Strokes)	Number of workers (Frequency)
20 –	~~////~~ /	6
30 –	~~////~~ ~~////~~	10
40 –	~~////~~ ~~////~~ ~~////~~ ///	18
50 –	~~////~~ ~~////~~ ~~////~~ ~~////~~ //	22
60 –	~~////~~ ~~////~~ //	12
70 –	~~////~~ //	7
80 –	~~////~~	5
Total		80

Omitting the tally column, we get the frequency table of sets in its final form as follows :

Sets of wages	20 –	30 –	40 –	50 –	60 –	70 –	80 –	Total
Frequency	6	10	18	22	12	7	5	80


I will use the simple frequency table if :

- The given data is distributed in a small range of numbers.
- The given data contains a small number of distinct values.


I will use the frequency table of sets if :

- The given data is distributed in a large range of numbers.
- The given data contains a large number of distinct values.

Remarks

1. The difference between the maximum and the minimum value of the given data is called the range of this data.
2. The difference between the upper limit and the lower limit of the set is called the length of this set.
3. To find the number of sets, we find the quotient of $\frac{\text{the range}}{\text{the length of the set}}$

   If the quotient is a mixed number, we take the next whole number.

Example 3

The following data shows the marks which 54 pupils got in maths, where the maximum mark is 60 marks :

42	41	43	27	$37\frac{1}{2}$	48	45	58	24	43	50
48	54	36	59	45	40	45	51	35	$39\frac{1}{2}$	46
38	40	36	45	35	30	20	36	40	50	54
47	47	47	46	39	$44\frac{1}{2}$	42	$42\frac{1}{2}$	56	48	45
29	55	30	25	34	42	32	51	28	44	

3
Lesson

Form a frequency table of sets using the sets :
(20 – , 25 – , 30 – , ... and 55 –) , then answer the following questions :

[a] How many pupils got less than 30 marks ?
And what is their percentage ?

[b] How many pupils got 50 marks or more ?
And what is their percentage ?

Solution

Sets of marks	Tally	No. of pupils (Frequency)
20 –	//	2
25 –	////	4
30 –	////	4
35 –	~~////~~ ////	9
40 –	~~////~~ ~~////~~ //	12
45 –	~~////~~ ~~////~~ ///	13
50 –	~~////~~ /	6
55 –	////	4
Total		54

Sets of marks	20 –	25 –	30 –	35 –	40 –	45 –	50 –	55 –	Total
No. of pupils (Frequency)	2	4	4	9	12	13	6	4	54

[a] The pupils who got less than 30 marks are : 2 + 4 = 6 pupils.

and their percentage = $\frac{6}{54} \times 100\ \% = 11\frac{1}{9}\ \%$

[b] The pupils who got 50 marks or more are : 6 + 4 = 10 pupils.

and their percentage = $\frac{10}{54} \times 100\ \% = 18\frac{14}{27}\ \%$

Exercise 20 Collecting the quantitative statistic data


Solve Exercise

From the school book

1 Complete the following :

(a) The difference between the greatest value and the smallest value in a set of individuals is called .... (Cairo 2017 , Souhag 2015)

(b) The range = ... – .... (Aswan 2011)

(c) If the values of a frequency distribution lie between (10 , 90) , then the range of this distribution = ... (Suez 2015)

(d) The range of the values : 5 , 2 , 9 , 6 , 6 and 4 is ....

(e) The range of the numbers 19 , 14 , 9 and 3 is .... (El-Dakahlia 2011)

(f) If the marks of 5 pupils in one of the tests are : 22 , 39 , 45 , 62 and 54 , then the range for these marks is equal to .... (Luxor 2014)

(g) If the range of a frequency distribution is 34 and the lowest value is 45 , then the highest value is .... (Ismailia 2012)

(h) If 87 is the greatest individual of a set and the range = 39 , then the smallest individual of this set equals .... (El-Sharkia 2017)

(i) Quantitative data distributed in the sets (5 – , 15 – , 25 – , 35 – , ···) , then the length of each set = ...

(j) If we divide the marks of the set of pupils into five sets and the range of these marks is 40 , then the length of the set = ... (Qena 2016)

2 Choose the correct answer :

(a) The range of the set of values 7 , 3 , 6 , 9 and 5 is .... (Giza 2017)
(3 *or* 4 *or* 6 *or* 12)

(b) If the marks of 6 pupils in one of the tests are 29 , 33 , 57 , 40 , 36 and 49 , then the range for these marks is equal to .... (El-Beheira 2011)
(4 *or* 13 *or* 28 *or* 20)

(c) If the values of a frequency distribution lie between (30 , 60) , then the range of this distribution = ... (El-Fayoum 2014)

(30 or 20 or 60 or 90)

(d) If the range of values = 40 and the number of sets = 10 , then the length of set = ... (Ismailia 2014) (4 or 30 or 40 or 50)

(e) If the range of the marks distribution of mathematics equals 40 and the length of a set equals 5 , then the number of sets equals ....

(Aswan 2015) (35 or 45 or 8 or 200)

---

3 A teacher asked 40 pupils "How many brothers and sisters do you have ?" Their responses were as follows :

1	3	5	0	5
4	1	2	3	2
0	1	1	1	3
3	2	1	0	4
1	1	1	2	0
0	3	1	2	0
2	1	0	3	1
1	0	1	2	0

No. of brothers and sisters	Tally	Frequency
0	....	....
1	....	....
2	....	....
3	....	....
4	....	....
5	....	....
Total		40

Complete the tally frequency table , then find :

(a) The number of pupils that have exactly 2 brothers and sisters and find their percentage.

(b) The number of pupils that have no brothers or sisters and their percentage.

(c) The number of brothers and sisters which is most common.



4 The following data shows the ages of 40 students.

Form a frequency table of the ages of these students , then answer :

15	18	18	17	14	15	17	16
15	16	18	19	16	15	15	17
16	17	18	16	14	17	16	16
17	15	14	19	16	15	14	17
18	18	17	16	19	20	15	14



(a) What is the range of these values ?

(b) What is the most common age of the students ?

(c) How many students are more than 17 years old ? And what is their percentage ?

5 The following data shows the additional wages of 30 workers :

40	17	50	82	64	28	66	52	36	70
71	46	42	56	48	23	64	39	30	60
58	52	33	54	68	50	78	62	45	44



Form the frequency table of sets , using the sets : 15 – , 25 – , 35 – , ... , then answer the following questions :

(a) What is the frequency of the set "35 –" ?

(b) How many workers whose wages are from 15 to less than 25 ?

(c) How many workers whose wages are more than or equal to L.E. 55 ?

6 The following data shows the marks of 40 pupils of the 6th primary grade in a maths test (the maximum mark is 20) :

7	11	7	13	14	3	18	13	10	14
16	8	15	12	5	15	11	12	6	11
8	9	15	8	15	14	7	10	14	19
10	7	2	10	12	4	11	17	13	15

3
Lesson

Form the frequency table of the marks , using the sets :
0 – , 4 – , 8 – , ... , etc. , then find the percentage of the pupils who got 12 marks or more.



7 The following data shows the number of days off that 40 workers of a factory have got during a year :

12	27	14	25	13	22	14	26	11	15
30	21	15	22	23	28	16	21	30	25
27	16	22	20	26	30	21	15	16	23
15	30	28	21	24	15	27	30	21	28

Form a frequency table of sets , the length of each set is 5 days , then find the number of workers who have got more than 20 days in the year and their percentage.



8 In a competition of an acceptance test for joining a sport college , the heights of 48 applicants in centimetres were as follows :

175	183	163	181	164	195
182	166	193	195	185	158
157	190	166	163	173	166
177	164	157	173	193	168
183	155	178	173	180	164
181	156	194	173	187	162
176	158	170	168	190	156
169	155	170	188	155	192



Form the frequency table of sets for the previous heights , then answer the following questions :

(a) What is the number of applicants having the greatest heights ? What is the percentage of those applicants ?

(b) What is the number of applicants whose heights are less than 165 centimetres ? What is the percentage of those applicants ?

(c) What's your advice for those applicants ?

9 The following frequency table of sets shows the shares of money in pounds hold by the pupils of a class in the project of building a hospital near to the school. Study it and answer :

The shares in pounds	20 –	30 –	40 –	50 –	60 –	70 –	Total
No. of pupils	3	6	8	12	7	4	40



(a) What is the number of pupils who shared with an amount of money from 40 to less than 50 pounds ?

(b) What is the number of pupils who shared with an amount of money = 60 pounds or more ? What is their percentage ?

10 The following table gives the frequency distribution of the daily wages in L.E. for the workers in a factory :

Wages (Sets)	50 –	60 –	70 –	80 –	90 –	100 –	Total
No. of workers (Frequency)	8	10	16	14	10	7	65

(a) How many workers whose wages are from 80 to less than 90 pounds ?

(b) How many workers whose wages 70 pounds or more ? What's their percentage ?

Lesson 4

Representing the statistic data by the frequency curve

To represent the tabulated data in a frequency table of sets by a frequency curve , we need to remember how to represent it by a frequency polygon as we had studied in 5^{th} prim. , the following example helps us remember that.

Illustrated Example : The following table shows the frequency distribution of marks of 40 pupils in the mathematics exam :

Sets	10 –	20 –	30 –	40 –	50 –	Total
Frequency	5	7	12	9	7	40

Represent these data by the frequency polygon.

Solution

[1] Draw two perpendicular axes. The horizontal axis represents sets and the vertical axis represents frequencies , by using a suitable drawing scale.

[2] Determine the centre of each set using the relation :

$$\text{Centre of the set} = \frac{\text{lower limit + upper limit}}{2}$$

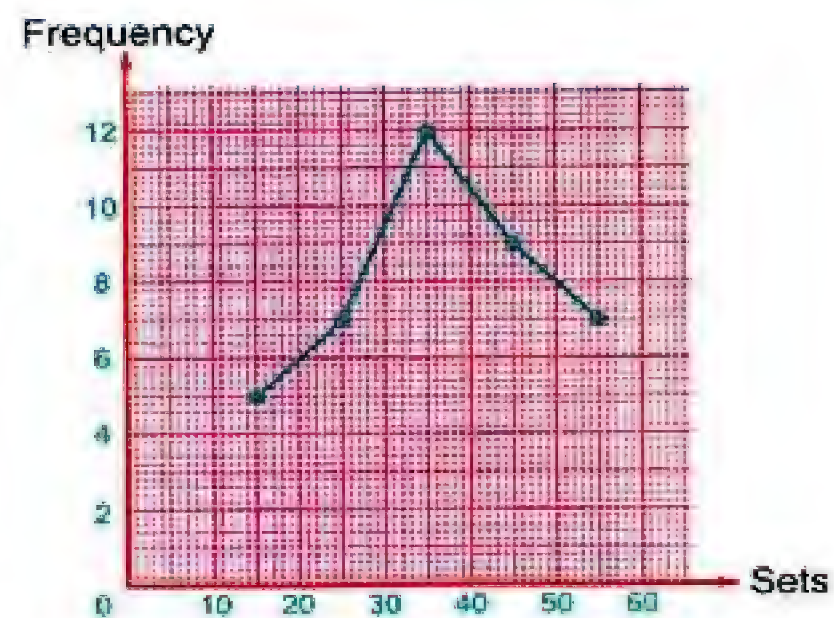
i.e. The centre of the set (10 –) is $\frac{10 + 20}{2} = 15$

and hence , the centres of the sets : 10 – , 20 – , 30 – , 40 – and 50 – are 15 , 25 , 35 , 45 and 55 respectively.

[3] Use the form

(Centre of the set , its frequency)

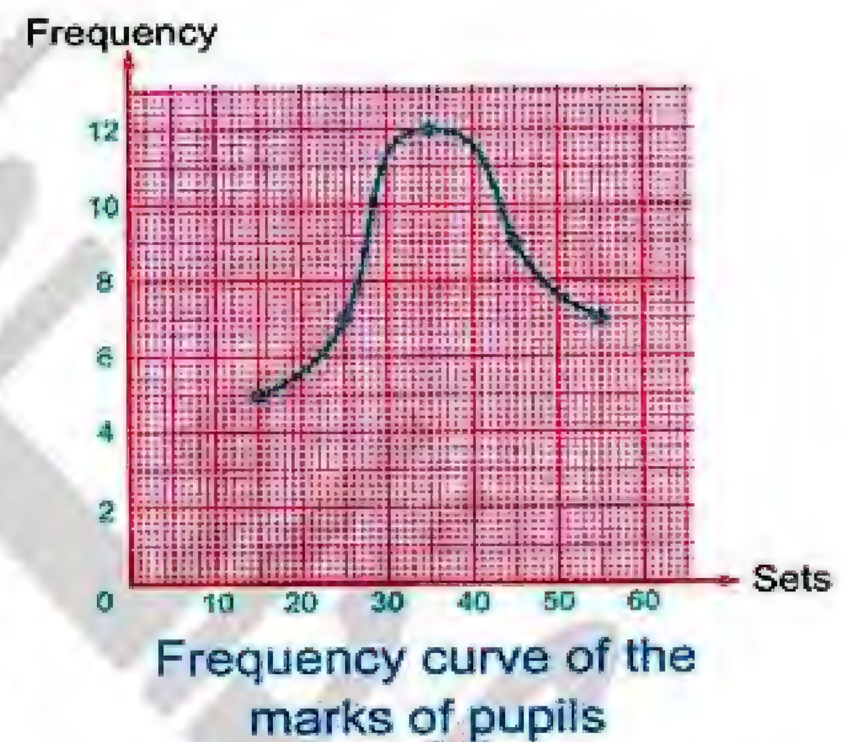
to get the ordered pairs that represent the centre of each set and its corresponding frequency , which are : (15 , 5) , (25 , 7) , (35 , 12) , (45 , 9) and (55 , 7)



[4] Draw the points that represent the previous ordered pairs on the plane of the two axes , then join each two consecutive points with a line segment to form a frequency polygon as in the previous graph.

The frequency curve

If we want to represent the data of the previous example by the frequency curve , we do steps [1] , [2] and [3] that we have done in the solution , but in step [4] instead of connecting the points with line segments , we draw a free hand smooth curve passing through most of the points , and the opposite graph shows the frequency curve of the marks of pupils in the previous example.



Frequency curve of the marks of pupils

Example

The following table shows the frequency distribution of the ages of 40 students in one school :

The ages	6 –	8 –	10 –	12 –	14 –	Total
Number of students	8	9	5	13	5	40

Draw the frequency curve of the previous table , then answer the following questions :

[a] How many students whose ages are 12 years or more ?

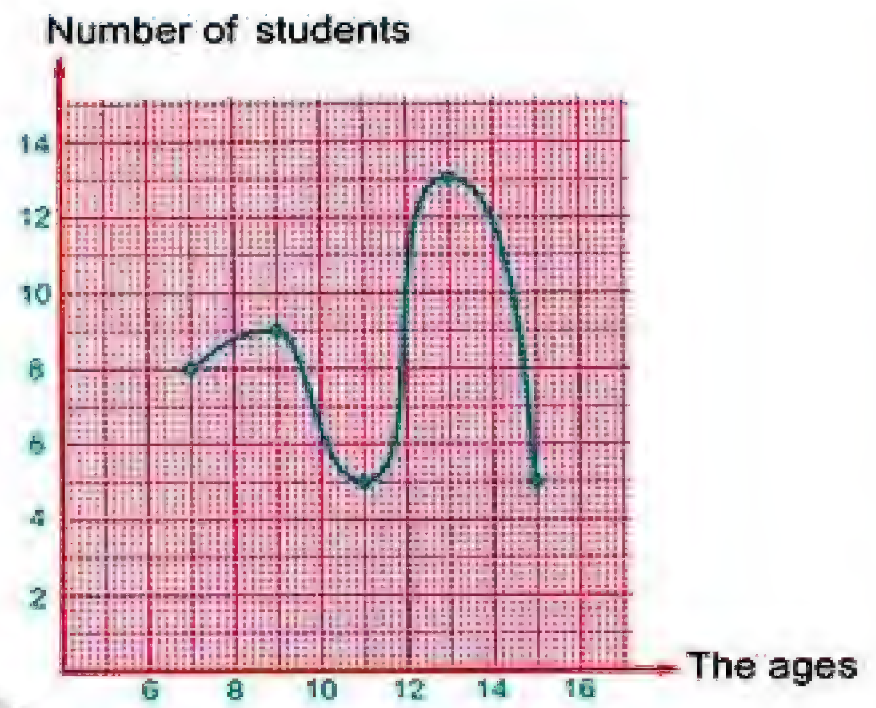
[b] How many students whose ages are less than 10 years ?

4
Lesson

Solution

[a] There are 18 students whose ages are 12 years old or more.

[b] There are 17 students whose ages are less than 10 years.



Exercise 21 Representing the statistic data by the frequency curve


Solve Exercise

📖 From the school book

1 The following table shows the number of hours which are spent by 60 pupils to study their lessons daily :

Number of hours	1 –	2 –	3 –	4 –	5 – 6	Total
Number of pupils	9	13	18	12	8	60

Represent these data by the frequency curve. (Assiut 2015)

2 The following table shows the number of hours which the pupils of a class spend daily in front of the computer :

Number of hours	1 –	2 –	3 –	4 –	5 –	6 –	Total
Number of pupils	7	11	15	6	4	2	45

Represent these data by the frequency curve. (Damietta 2013)

3 📖 The following table shows the marks of 100 students in one month in math :

Marks	20 –	30 –	40 –	50 –	Total
Number of students	15	30	40	15	100

(a) What is the number of students who record less than 40 marks ?

(b) Draw the frequency curve for this distribution. (El-Sharkia 2016)

4 📖 On the Orphan's day , a group of students donated amounts of money in pounds shown in the following table :

Money in pounds	3 –	5 –	7 –	9 –	11 –
Number of students	7	10	15	10	8

(a) What is the number of students who donated 7 pounds or more?

(b) Draw the frequency curve for this frequency distribution.

(El-Menia 2017 , Souhag 2012)



4
Lesson

5 The following data represents the marks in the mathematics test for students in 6^{th} grade :

Sets	0 –	10 –	20 –	30 –	40 –	50 – 60
Frequency	6	10	15	20	8	4

(a) Draw the frequency curve for this distribution.

(b) Complete :

[1] The number of students whose marks are less than 20 = ...

[2] The number of students whose marks are 40 and more = ...

6 The following table shows the ages of visitors to an exhibition within an hour of the day :

Visitor's age	10 –	20 –	30 –	40 –	50 –	Total
Number of visitors	6	9	12	10	8	45

(a) What is the number of visitors whose ages are less than 40 years ?

(b) Draw the frequency curve for this distribution. (Souhag 2017 , Alexandria 2016)

7 The following table shows the extra money which 100 workers got in a month in a factory , they are as follows :

The extra money	20 –	30 –	40 –	50 –	60 –	70 –	Total
Number of workers	20	15	30	20	10	5	100

(a) What is the number of workers who obtained extra money less than 50 pounds?

(b) Draw the frequency curve of this distribution. (El-Beheira 2011)

8 The following frequency table represents the daily wages in pounds for a sample formed from 47 workers in a factory :

Wages	10 –	20 –	30 –	40 –	50 –	60 –	Total
Number of workers	3	6	10	15	8	5	47

(a) Draw the frequency curve for this distribution.

(b) How many workers whose daily wages are 40 pounds or more ?

(Beni Suef 2013)

9 The following table shows the times and the number of trips (in one of the bus stations for the governorates) :

Times	6 am –	8 am –	10 am –	12 pm –	2 pm –	Total
Number of trips	30	41	40	16	13	140

Draw the frequency curve for this distribution , then answer the following questions :

(a) What is the number of trips before 10 am ?
(b) What is the percentage of the number of trips from 10 am till 12 pm to the total of trips ?

10 The following table shows the daily hours of studying for 50 students :

Number of hours	2 –	4 –	6 –	8 –	10 –	Total
Number of students	8	9	15	13	....	50

(a) Complete the table.
(b) Represent these data by the frequency curve. (El-Dakahlia 2014)

11 The following data represent the daily income of 40 persons in L.E. :

Sets	10 –	20 –	x –	40 –	50 –	Total
Frequency	5	8	11	9	y	40

(a) Find x and y
(b) Find the set of the greatest frequency.
(c) Find the number of persons who get L.E. 30 and more daily.

12 Ola and Nargis registered the temperature degrees which are expected for 30 cities in one of the summer days through watching the news in television. They formed the following frequency table :

Temperature degree	24 –	28 –	32 –	36 –	40 –	44 –	Total
Number of cities	3	4	7	9	5	2	30

Draw the frequency curve of the previous table ,
then answer the following questions :

4
Lesson

(a) What is the number of cities whose temperature degrees are 40 degrees or more ? What do you advise these cities inhabitants ?

(b) What is the number of cities which are suitable for summer season on that day ?

(c) What is the number of cities whose temperature degrees are mild on that day from your own point of view ?



For Excellent Pupils

13 The following table shows the number of flights done in Cairo Airport in the period from 12 at noon till 8 in the morning of the next day :

Time	12 pm –	4 pm –	8 pm –	12 am –	4 am –	Total
Number of flights	32	41	42	19	13	147

Represent these data by frequency curve, then answer the following questions :

(a) In what time is Cairo Airport most crowded ? Why ?

(b) In what time is Cairo Airport least crowded ?

(c) What is the percentage of the number of flights coming to Cairo Airport in the period from 12 at noon till 4 pm ?

(d) What is the percentage of the number of flights coming to Cairo Airport after 12 pm ?



Test on Unit Four

Answer the following questions :

1 Choose the correct answer :

(a) The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

(3 or 4 or 6 or 12)

(b) If the range of values = 60 and the number of sets = 10 , then the length of set = ... (50 or 40 or 5 or 6)

(c) .... is one of descriptive data.

(The weight or The age or The favourite colour or The temperature degree)

(d) The following data are quantitative except ....

(age or birth place or length or weight)

(e) If the lower limit of a set is 20 and the upper limit of this set is 30 , then the centre of the set = ... (20 or 25 or 30 or 50)

2 Complete the following :

(a) The blood species is .... data.

(b) The difference between the greatest value and the smallest value in a set of individuals is called ....

(c) If 95 is the maximum value of a set and the range equals 48 , then the minimum value of this set is ....

(d) If we divide the marks of a set of pupils into five sets and the range of these marks is 40 , then the length of each set = ...

(e) The length is .... data.

3 The following table shows the marks of 100 students in one month in math :

Marks	20 –	30 –	40 –	50 –	Total
Number of student	20	30	35	15	100

(a) What is the number of students who record less than 40 marks ?

(b) What is the number of students who record 30 marks or more ?

(c) Draw the frequency curve for this distribution.





TIMSS Questions







TIMSS* Questions

First : Choose the correct answer :

1 If $\{3, 5\} \subset \{3, 7, x\}$, then $x =$ ....
(a) 5 (b) 9 (c) 6 (d) 15

2 The angle between the two hands of the clock is straight when the time is .... O'clock.
(a) 12 (b) 9 (c) 3 (d) 6

3 The sum of measures of the interior angles of the triangle = ...
(a) 360° (b) 180° (c) 90° (d) 108°

4 .... is not a prime number.
(a) 2 (b) 5 (c) 7 (d) 9

5 The highest common factor for the two numbers 12 and 30 is ....
(a) 60 (b) 42 (c) 6 (d) 3

6 If the string in the diagram below is pulled straight, which of these is closest to its length ?



(a) 5 cm. (b) 7 cm. (c) 8 cm. (d) 9 cm.

* TIMSS : Trends of the International Mathematics and Science Studies.

7 The area of a square whose diagonal length is 8 cm. equals ………… cm^2.

(a) 64 (b) 32 (c) 16 (d) 4

8 If t is a number between 6 and 9 , then t + 5 is between what two numbers ?

(a) 1 and 4 (b) 10 and 13 (c) 11 and 14 (d) 30 and 45

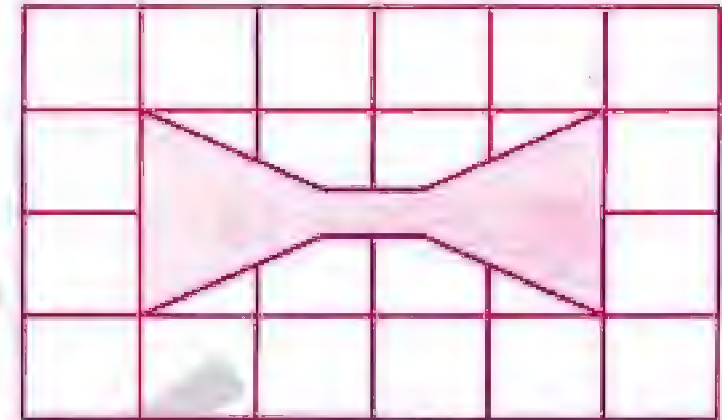
9 (number line: 26, 27, K 28) Which number does K represent on this number line ?

(a) 27.4 (b) 27.8 (c) 27.9 (d) 28.2

10 If a : b = 2 : 5 , then $\frac{a}{a+b}$ = …………

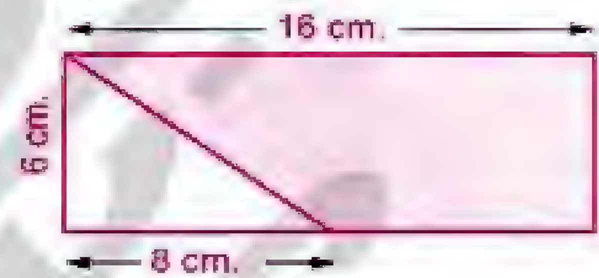
(a) 2 : 5 (b) 2 : 7 (c) 3 : 7 (d) 7 : 2

11 How many lines of symmetry does this figure have ?



(a) 1 (b) 2
(c) 3 (d) 4

12 In the opposite figure , what is the area of the shaded region in cm^2 ?



(a) 24 (b) 44
(c) 48 (d) 72

13 A thin wire 20 centimetres long is formed into a rectangle. If the width of this rectangle is 4 centimetres, what is its length ?

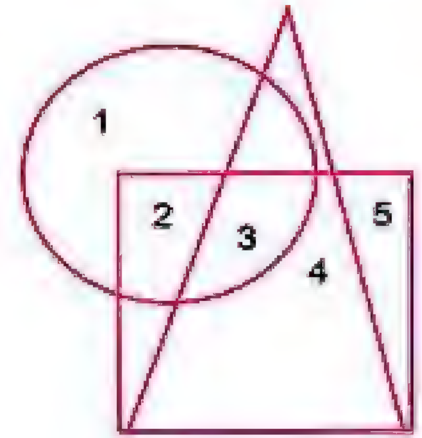
(a) 5 centimetres (b) 6 centimetres
(c) 12 centimetres (d) 16 centimetres

14 Four children measured the width of a room by counting how many paces it took them to cross it. The opposite table shows their measurements. Who had the longest pace ?

Name	Number of paces
Ahmed	10
Sameh	8
Aly	9
Wael	7

(a) Ahmed (b) Sameh (c) Aly (d) Wael

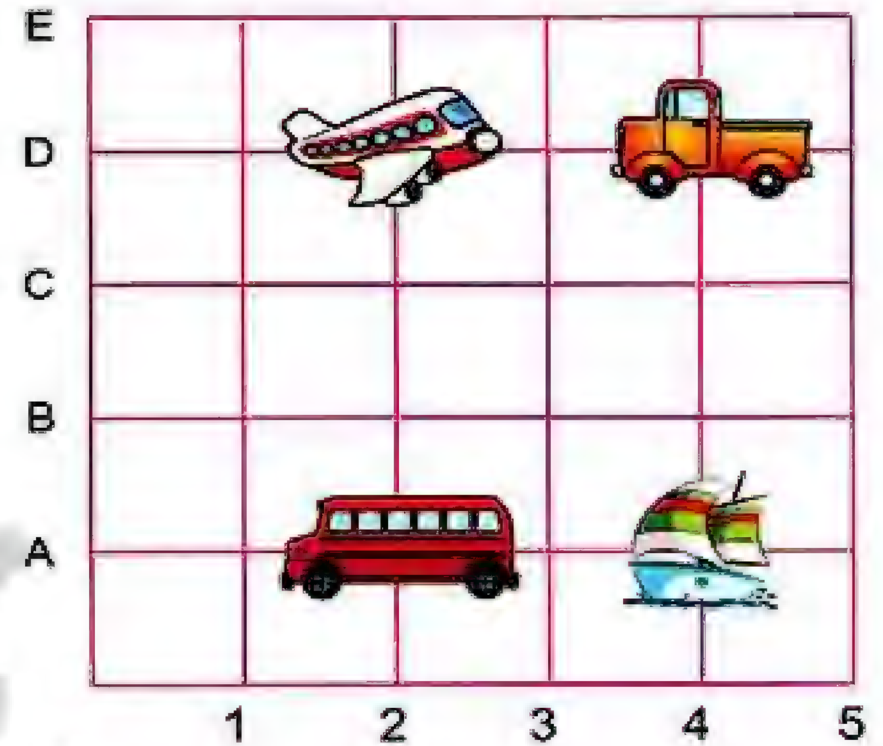
15 Which number is in the square and the circle but is NOT in the triangle ?



(a) 2 (b) 3

(c) 4 (d) 5

16 Which object is located at (2 , D) ?



(a) The plane

(b) The truck

(c) The bus

(d) The boat

17 2538 ÷ 18 ………… 2538 × 18

(a) < (b) = (c) > (d) ≥

18 The greatest 10-digit number formed from the digits from 0 to 9 is …………

(a) 1 234 567 890 (b) 9 087 654 321

(c) 9 876 543 210 (d) 9 876 543 201

19 All even numbers are divisible by …………

(a) 0 (b) 2 (c) 4 (d) 6

20 ………… is a multiple of any number.

(a) 0 (b) 1 (c) 3 (d) 2

21 (511 + …………) is divisible by 5

(a) 1 (b) 3 (c) 6 (d) 9

22 $\frac{20-20}{16-4\times3+6}$ = …………

(a) is not defined (b) $\frac{40}{6}$ (c) 0 (d) 10

23 M ………… {Mohamed}

(a) $\in$ (b) $\notin$ (c) $\subset$ (d) $\not\subset$

24 If {1 , 5 , 6} ∩ {5 , x , 3} = {5 , 6} , then x = …………

(a) 1 (b) 3 (c) 5 (d) 6

25 $\left(2.4 + \frac{3}{5}\right)$ ………… $\mathbb{N}$

(a) $\notin$ (b) $\in$ (c) $\subset$ (d) $\not\subset$

26 If △ + □ + □ = 120 , △ + □ = 70 , then □ = …………

(a) 25 (b) 75 (c) 50 (d) 100

27 $\frac{186}{187}$ ………… $\frac{9}{9}$

(a) < (b) > (c) = (d) ≥

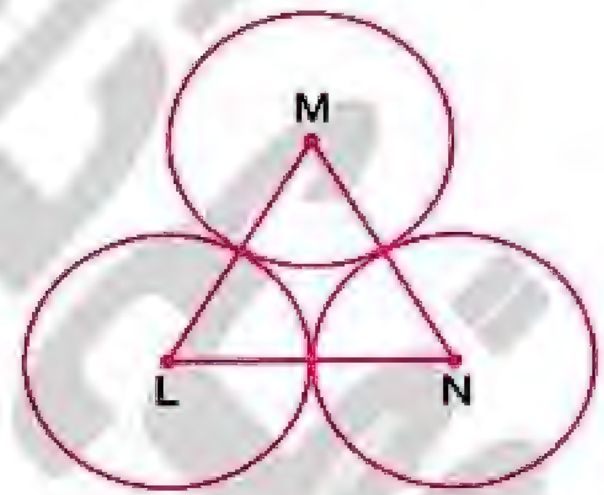
28 7 081 ≃ 7 000 to the nearest …………

(a) 10 (b) 100 (c) 1 000 (d) 10 000

29 39 months ≃ ………… years.

(a) 2 (b) 4 (c) 3 (d) 3.3

30 **In the opposite figure :**



If the length of each radius in the three circles is 3 cm. , then the perimeter of the triangle MLN equals ………… cm.

(a) 3 (b) 6

(c) 9 (d) 18

31 Which of these techniques can transform the letter Z into the letter N ?

(a) rotation. (b) translation. (c) reflection.

32 The probability of an impossible event = …………

(a) ∅ (b) 1 (c) 0 (d) 2

33 Double the number x subtracted 7 from it equals …………

(a) $2x + 7$ (b) $2x - 7$ (c) $7x + 2$ (d) $14x$

34 There are .... lines of symmetry of the square.
(a) four (b) three (c) two (d) one

35 If the radius length of a circle is 20 cm. , then its circumference equals .... cm.
(a) 10 π (b) 20 π (c) 40 π (d) 80 π

36 If the lengths of two adjacent sides in a parallelogram are 5 cm. and 7 cm. , its smaller height = 3 cm. , then its area = ... cm^2.
(a) 15 (b) 21 (c) 36 (d) 9

37 Any line segment connects between any two points on the circle is called ....
(a) a diameter. (b) a radius. (c) a chord. (d) a centre.

38 $\frac{1}{8} \simeq$ .... $\left(\text{to the nearest } \frac{1}{10}\right)$
(a) 0.125 (b) 0.12 (c) 0.1 (d) 13

39 Ahmed wanted to use his calculator to add 1 463 and 319 , he entered 1 263 + 319 by mistake. What could he do to correct his mistake ?
(a) add 200 (b) add 2
(c) subtract 2 (d) subtract 200

40 The smallest odd prime number is ....
(a) 1 (b) 2 (c) 3 (d) 5

41 The value of the digit 7 in the number 278 554 321 is ....
(a) 7 millions (b) 70 millions
(c) 700 millions (d) 7 000 millions

42 If 458 × 29 = 13 282 , then 458 × 290 = ...
(a) 13 282 (b) 132 820 (c) 13 280 (d) 13 208

43 The points A , B and C lie on a line and B is between A and C If AB = 10 cm. and BC = 5.2 cm. , what is the distance between the midpoints of $\overline{AB}$ and $\overline{BC}$?
(a) 2.4 cm. (b) 2.6 cm. (c) 5 cm. (d) 7.6 cm.

44 π = ...

(a) $\frac{\text{circumference}}{r}$ (b) $\frac{\text{circumference}}{2\,r}$

(c) $\frac{2\text{ circumference}}{r}$ (d) $\frac{\text{circumference}}{3\,r}$

45 Ali left Banha and rode at the same speed for 2 hours. He reached this sign. Ali continues to ride at the same speed to Tanta. How many hours will it take him to ride from the sign to Tanta ?



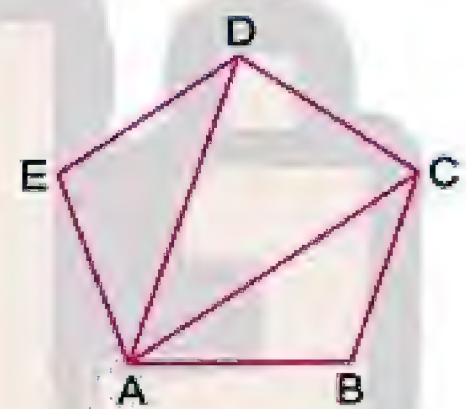
(a) $1\frac{1}{2}$ hours. (b) 2 hours.

(c) 3 hours. (d) $3\frac{1}{2}$ hours.

Second : Answer the following questions :

1 What is the sum of all the interior angles of the pentagon ABCDE ?

Show your working.



2 What is the smallest whole number that if approximated to the nearest ten thousand gives a result of 10 000 ?

3 The greatest number of five consecutive natural odd numbers is y + 15 Find the other four numbers.

4 If the circumference of a circle is 3 times the perimeter of a square , where the radius of the circle is 10.5 cm. long, find the side length of the square. $\left(\pi = \frac{22}{7}\right)$

5 A box contains 18 balls , $\frac{1}{6}$ of them are red , $\frac{1}{3}$ of them are blue and the rest are green. A ball is drawn at random from the box. What colour has the greatest chance to be drawn ?

Glossary

A

absent	غائب
adjacent	مجاور
agriculture	زراعة
among	بين
annual	سنوى
application	تطبيق
aquarium	حوض سمك
area	مساحة

B

better	أفضل
bisect	يقسِّم / ينصِّف
build	يبنى
building	مبنى
business	مشروع / تجارة

C

candidate	مرشح إلى وظيفة أو انتخابات أو ... إلخ
capacity	السعة
circumference	محيط الدائرة
collecting	تجميع
column	عمود
commercial	تجارى
company	شركة
compare	يقارن
competition	منافسة
cone	مخروط
consecutive	متتالى
consume	يستهلك
consumption	استهلاك
contain	يحتوى / يتضمن
container	صهريج / حاوية
cost	تكلفة
cube	مكعب
cuboid	متوازى مستطيلات
curve	منحنى
cylinder	أسطوانة

D

data	معلومات
define	يعرِّف / يحدد
descriptive	وصفى
diagonal	قُطر
dimension	بُعد
discount	تخفيض
discover	يكتشف
distinct	واضح
distribute	يوزع
drawing	الرسم

E

edifice	مبنى ضخم
employee	موظف
engineer	مهندس
enlargement	تكبير
extreme	طرف التناسب

F

face	وجه
family	عائلة
feddan	فدان
frequency	التكرار

G

goods	بضائع

H

height	ارتفاع

I

illiteracy	الأمية
income	الدخل
inner	داخلى
internal	داخلى

J

jam	مربى
jar	برطمان
juice	عصير

K

kirat	قيراط

L

leak	يتسرَّب
lid	غطاء

M

machine	آلة
magnification	تكبير / تعظيم



magnify	يكبِّر / يعظِّم
map	خريطة
maximum	الحد الأقصى
merchant	تاجر
method	طريقة
microscope	مِجهر
minaret	مِئذنة
mineral water	ماء معدنى
minimization	تقليل / تصغير
minimum	الحد الأدنى

N

need	يحتاج
neighbourhood	جوار / قرب
nominated	محدد / معين

O

omit	يحذف

P

paint	يدهن
parallel	متوازى / يوازى
parallelogram	متوازى أضلاع
participate	يشارك
pattern	تسلسل
pave	يبلط / يرصف
pay	يدفع
percentage	نسبة مئوية
performance	أداء
perimeter	محيط
perpendicular	عمودى
piece	قطعة
plough	يحرث
prelude	تمهيد
present	يحضر / هدية
profit	مكسب
project	مشروع
property	خاصية
proportion	تناسب

Q

quadrilateral	شكل رباعى
quantitative	كمىّ
quantity	كمية / مقدار

R

rate	معدل
ratio	نسبة
reduction	تصغير / تقليل
represent	يعرض
row	صَفّ

S

salary	مرتب
scale	مقياس
scientific	علمىّ
share	يشارك
spend	يصرف / ينفق
statistics	الإحصاء
stroke	علامة
survey	فحص

T

tank	صهريج / حوض
tap	صنبور
tessellation	فُسيفِسَاء
thickness	سُمك
tourist	سائح
tractor	جرار
trip	رحلة

U

unreasonable	غير منطقى

V

value	قيمة
vessel	وعاء
village	قرية
visual	بصرىّ
volume	حجم

W

wage	أجر
weight	وزن
wire	سلك

Sheet 1

On lesson 1 unit 1

Total mark 20

1 Choose the correct answer between brackets :



[a] 50 : 300 = ………… (2 : 5 or $\frac{1}{5}$ or 1 : 6 or $\frac{1}{10}$)

[b] $\frac{3}{5}$: $\frac{5}{8}$ = ………… : 25 (24 or 27 or 15 or 40)

[c] 5.5 : 22 = ………… : ………… (5 : 2 or 4 : 1 or 1 : 4 or 2 : 5)

[d] 1.5 : 2.5 = ………… (5 : 3 or $\frac{3}{5}$ or 3 : 25 or $\frac{5}{9}$)

[e] The ratio between the length of a side of a square and its perimeter = ………… : ………… (1 : 1 or 4 : 1 or 1 : 4 or 1 : 16)

2 Complete each of the following :



[a] The ratio is …………

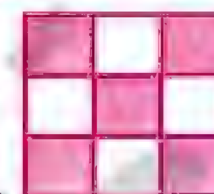
[b] In the ratio $\frac{9}{17}$, the first term is ………… and the second term is …………

[c] The radius length of a circle : the circumference of the circle = ………… : …………

[d] $\frac{2}{3}$: $3\frac{1}{3}$ = ………… : ………… (in the simplest form)

[e] The ratio between the perimeter of an equilateral triangle and its side length is ………… : …………

3 In the opposite figure :





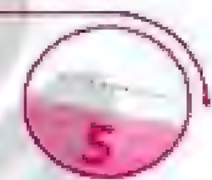
Find the ratio between :

[a] The number of coloured squares and the number of all squares.

[b] The number of uncoloured squares and the number of coloured squares.

[c] The number of all squares and the number of uncoloured squares.

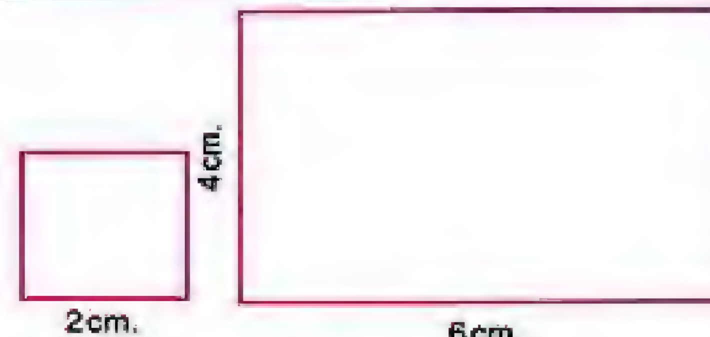
4 [a] A school has 200 pupils , if 80 pupils of them are girls , find the ratio between the number of boys and the number of girls.



[b] **Put each of the following ratios in its simplest form :**

(1) 5 : $\frac{5}{4}$ (2) $2\frac{2}{3}$: $1\frac{1}{3}$ (3) $\frac{1}{3}$: 0.2 (4) $\frac{15}{45}$

5 In the opposite figure :





Find the ratio between :

[a] The perimeter of the square and the perimeter of the rectangle.

[b] The area of the square and the area of the rectangle.



Sheet 2

From lesson 1 unit 1
to lesson 2 unit 1

Total mark 20

1 ***Complete each of the following :*** (5)

[a] $\frac{1}{4}$ hour : 20 minutes = ………… : ………… (in the simplest form)

[b] 4.5 : 9 = ………… : …………

[c] P.T. 50 : L.E. $1\frac{1}{2}$ = ………… : ………… (in the simplest form)

[d] The ratio between the lengths of two sides of a square is ………… : …………

[e] 2 m. : 400 cm. = 1 : …………

2 ***Choose the correct answer between brackets :*** (5)

[a] The diameter length of the circle : its circumference = …………
(1 : 2π or 1 : π or π : 1 or 2π : 1)

[b] $\frac{1}{8}$ kg. : 100 gm. = ………… (4 : 5 or 5 : 2 or 8 : 15 or 5 : 4)

[c] 16 kirats : 1 feddan = ………… : …………
(16 : 1 or 2 : 3 or 3 : 2 or 8 : 3)

[d] $\frac{2}{3}$: $\frac{3}{4}$ = ………… : ………… (in the simplest form)
(8 : 9 or 2 : 3 or 2 : 4 or 8 : 7)

[e] 18 hours : one day = ………… : …………
(2 : 9 or 1 : 3 or 3 : 4 or 4 : 3)

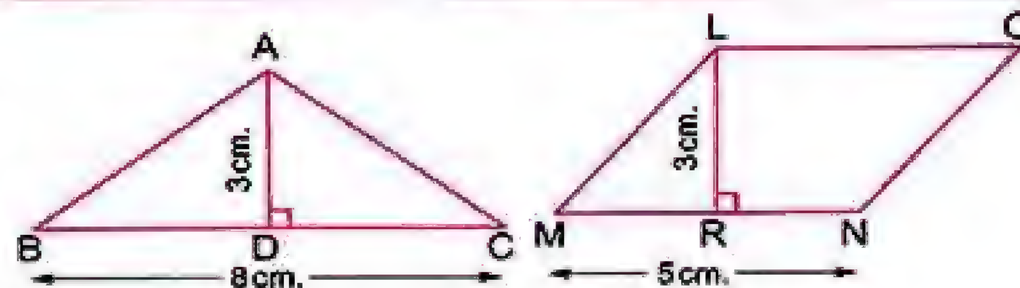
3 ***Find each of the following ratios in its simplest form :*** (4)

[a] 6 days : 2 weeks [b] 5 dm. : 5 m.

[c] 5 kg. : 7 000 gm. [d] $\frac{1}{2}$ L. : 250 mL.

4 The distance between Adel's house and the sport's club which he joins is 350 metres and the distance between his house and his school is 1.4 kilometres. What is the ratio between the two distances ? (3)

5 ***In the opposite figure :*** (3)
Find the ratio between the area of the triangle ABC and the area of the parallelogram LMNO



Sheet 3

From lesson 1 unit 1
to lesson 3 unit 1

Total mark 20

1 ***Complete :*** (5)

[a] If the ratio between Tamer's height and Hend's height is 9 : 8 and the difference between their heights is 20 cm. , then the height of Hend is .... cm.

[b] The ratio between two numbers = $\frac{\text{.................}}{\text{.................}}$

[c] P.T. 750 : L.E. 10 = ... : ....

[d] A rectangle of perimeter 42 cm. and the ratio between its length and its width is 5 : 2 , then its length is .... cm. and its width is .... cm.

[e] 300 gm. : $1\frac{1}{2}$ kg. = ... : .... (in the simplest form)

2 If the ratio between the number of boys and the number of girls in a class is 2 : 3 , if the number of boys is 12 , find the number of girls. (3)

3 ***Choose the correct answer between brackets :*** (5)

[a] Two wires , the ratio between their lengths is 3 : 4 and the length of the first wire is 75 cm. , then the length of the second wire is .... m. (1 or 100 or 10)

[b] If the area of a rectangle is 40 cm^2. and its length is 0.8 dm. , then the ratio between its length and width = ... : ....
(5 : 8 or 8 : 5 or 5 : 1)

[c] The ratio between what Yassmien and Marwa has is 3 : 5 , if Marwa has 40 pounds , then Yassmien has .... pounds.
(30 or 15 or 24)

[d] The ratio 12 : 18 in its simplest form by dividing both terms by .... (2 or 3 or 6)

[e] If the sum of two numbers is 40 and the ratio between them is 3 : 5 , then the smaller one = ... (8 or 15 or 25)

4 If the sum of two amounts of money is L.E. 1800 and the ratio between the two amounts is 2 : 7 , find each of the two amounts. (3)

5 The ratio between the length and the width of a rectangle is 7 : 4 , if the width is less than the length by 21 cm. , then find the area of the rectangle. (4)



Sheet 4

From lesson 1 unit 1
to lesson 4 unit 1

Total mark 20

1 *Complete each of the following :* (5)

[a] 12 : 18 : 30 = ………… : ………… : ………… (in the simplest form)

[b] 2.5 : 5 : 3.5 = ………… : ………… : ………… (in the simplest form)

[c] 0.5 km. : 700 m. : 900 m. = ………… : ………… : ………… (in the simplest form)

[d] If a : b = 3 : 5 and b : c = 2 : 5 , then a : b : c = ………… : ………… : …………

[e] The ratio between the side length of a rhombus and its perimeter = ………… : …………

2 (4)

[a] If the ratio between the measures of the angles of a triangle is 3 : 4 : 5 Find the measure of each angle of the triangle.

[b] The ratio between two numbers is 5 : 6 , if their sum is 297 Find the two numbers.

3 *Choose the correct answer between brackets :* (5)

[a] If a : b = 5 : 6 and b : c = 3 : 4 , then a : c = ………… : …………
(3 : 5 or 5 : 3 or 5 : 8 or 8 : 5)

[b] $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$ = ………… : ………… : …………
(2 : 3 : 4 or 4 : 3 : 2 or 6 : 4 : 3 or 3 : 4 : 2)

[c] 400 piastres : 12 pounds = ………… : …………
(1 : 3 or 3 : 1 or 1 : 4 or 2 : 3)

[d] The ratio between three numbers is 3 : 4 : 7 and their sum is 70 , then the greatest number is ………… (15 or 35 or 20 or 14)

[e] 16 : 48 = $\frac{1}{\cdots\cdots}$ (2 or 4 or 5 or 3)

4 (4)

[a] A piece of land in the form of a triangle , the ratio between its side lengths is 4 : 6 : 7 , if the perimeter of this land equals 51 m. Find the lengths of its sides.

[b] If the ratio between Adam's money : Nada's money : Seif's money is 6 : 5 : 2 , and the difference between Adam's money and Seif's money is L.E. 200 Find the money of each one of them.

5 If L.E. 988 is divided among Mohamed, Hany and Amr such that the share of Mohamed is $\frac{1}{2}$ of that of Hany and the share of Hany is $\frac{3}{2}$ of that of Amr. Find the share of each of them. (2)

Sheet 5

From lesson 1 unit 1
to lesson 5 unit 1

Total mark 20

1 ***Choose the correct answer between brackets :***

[a] A tractor ploughs 14 feddans in 3.5 hours , then the rate of performance of the tractor = ... feddans/hour. ($\frac{1}{4}$ or 4 or 10.5 or 7)

[b] A factory produces 4 000 cans for juice during 8 hours , then the rate of the production is .... cans/hour

(32 000 or 500 or 5 000 4 008)

[c] A machine produces 500 m. of material in 2 hours and half , then the rate of the production of this machine is .... m./hour.

(400 or 125 or 1 000 or 200)

[d] If Omar drinks 14 glasses of milk weekly , then the rate of what he drinks daily is .... glasses. (3 or 7 or 14 or 2)

4

2 [a] If a car covers 270 km. in three hours , find the average speed of the car through this trip.

[b] The number of pupils in the sixth grade in a school is 260 , the ratio between the number of boys to the number of girls is 6 : 7

Find the number of each of boys and girls in this grade.

4

3 [a] If the ratio between Bassem's share : Mina's share : Amgad's share is 3 : 4 : 5 and the share of Bassem is L.E. 24

Calculate the share of each of Mina and Amgad.

[b] A factory produces 200 bottles of juice in 10 hours.

Calculate the production rate of the factory.

4

4 [a] A machine produces 450 kg. of metal in 3 hours. Calculate the rate of production of the machine.

[b] If a worker paints a wall of area 45 m^2 in 5 hours , what is the rate of his work ? and how many square metres does the same worker paint in 7 hours ?

4

5 [a] The ratio between the heights of two buildings is 3 : 7 , if the second building is 35 m. high. Find the height of the first building.

[b] A car consumes 160 litres of petrol to cover a distance of 240 km. Find the rate of consumption petrol of that car.

4



Sheet 6

From lesson 1 unit 1
to lesson 1 unit 2

Total mark 20

1 Complete each of the following : (5)

[a] The proportion is ....

[b] $\frac{7}{12} = \frac{28}{\dots} = \frac{\dots}{36}$

[c] $\frac{8}{\dots} = \frac{1}{3} = \frac{\dots}{15}$

[d] $\frac{\dots}{6} = \frac{12}{18} = \frac{6}{\dots} = \frac{\dots}{3}$

[e] 150 gm. : $\frac{1}{4}$ kg. = ... : ....

2 A car consumes 12 litres of petrol in 150 km. (2)

Complete the following proportion table :

Petrol in litre	12	....	36
Distance in km.	150	100	....

3 Complete the following table to make the corresponding numbers in the two rows proportional : (3)

1.3	....	1	3	....	5.5	....
....	5	10	....	45	....	6.7

4 The number of pupils in a primary school is 400 pupils , if the number of girls is 250 , find : (5)

[a] The ratio between the number of girls and the number of boys.

[b] The ratio between the number of boys and the number of all pupils.

5 A machine produces 16 units from a certain product in 4 hours , what is the rate of the machine ? then how long does this machine take to produce 25 units ? (5)

Sheet 7

From lesson 1 unit 1
to lesson 2 unit 2

Total mark 20

1 Complete : (5)

[a] The product of the extremes = the product of ....

[b] The fourth proportional term in 3 , 6 and 12 is ....

[c] If 3 , x , 12 and 16 are proportional numbers , then x = ... and it is called the .... term.

[d] If $\frac{5}{9} = \frac{15}{x}$, then x = ...

[e] If $\frac{a}{b} = \frac{x}{y}$, then a × y = ... × ....

2 Complete the missing number in each of the following proportions : (4)

[a] 2 , 11 , 8 , ...
[b] 5 , 8 , ... , 24
[c] 9 , ... , 4.5 , 4
[d] .... , 7 , 24 , 56

3 Choose the correct answer : (5)

[a] If $\frac{a+6}{20} = \frac{1}{2}$, then a = ... (6 or 4 or 3 or 10)

[b] If the numbers 2 , 3 , 4 and x are proportional , then the value of x = ... (5 or 6 or 7 or 8)

[c] $\frac{2}{5} = \frac{\cdots\cdots}{17.5}$ (35 or 10 or 7 or 2.5)

[d] 18 hours : one day = ... (18 : 1 or 4 : 3 or 3 : 4 or 2 : 3)

[e] If 3 a = 4 b , then $\frac{a}{b}$ = ... ($\frac{3}{4}$ or $\frac{2}{3}$ or $\frac{4}{3}$ or $\frac{3}{2}$)

4 (4)

[a] A car consumes 20 litres of fuel to cover a distance of 180 km. How many litres are needed to cover 540 km.

[b] If the ratio among the heights of three buildings is 3 : 4 : 5 , the height of the first building is 21 m. Calculate the height of the second and the third buildings.

5 A machine produces 1 400 m. of textile in two hours. Calculate the needed time to produce 4 900 m. of textile. (2)

Sheet 8

From lesson 1 unit 1
to lesson 3 unit 2

Total mark 20

1 **Complete :** (5)

[a] The drawing scale = $\frac{\text{..................}}{\text{..................}}$

[b] If the drawing scale is 1 : 300 , and the length in drawing is 2 cm. , then the length in reality = ... metres.

[c] If the drawing length of an object is 3 cm. and its real length is 30 metres , then the drawing scale is ....

[d] The ratio $\frac{5}{13}$, its first term is .... and its second term is ....

[e] If the drawing scale is less than 1 , then it refers to ....

2 (4)

[a] The distance between two cities is 20 km. , if the distance between them on a map is 4 cm.
Find the drawing scale of this map and what does it mean ?

[b] The real length of an insect is 0.4 mm. and its length under a microscope is 2 cm. , find the ratio of magnification.

3 Cairo tower is one of the tourists places of Cairo , its height is 187.2 m. , if its height in a picture is 13 cm. (3)

[a] Find the drawing scale.

[b] If the length of a neighboured building in the same picture is 3.5 cm. Find its real length.

4 (4)

[a] The ratio of the production of three factories for TV sets is 3 : 2 : 1 , if the sum of their production is 9 600
Find the production of each one.

[b] An engineer drew a map of a rectangular garden with a scale 1 : 3 000
Find the real area of this garden if its dimensions on the map are 3.6 cm. and 2 cm.

5 (4)

[a] The real distance between Cairo and Alexandria is 220 km. , find the distance between them on a map drawn with a scale 1 : 500 000

[b] A magnified picture of an insect was photographed by a scale 200 : 1
Find the length of the insect in the picture if its real length is 0.14 mm.

Sheet 9

From lesson 1 unit 1
to lesson 4 unit 2

Total mark 20

1 [a] Distribute L.E. 360 among three persons in the ratio 5 : 3 : 4 (4)

[b] The difference between two numbers is 12 and the ratio between them is 5 : 7 Find the two numbers.

2 Three persons participated in a commercial , the first paid L.E. 15 000 , the second paid L.E. 25 000 and the third paid L.E. 20 000 (4)

At the end of the year , the profit was L.E. 5 520

Find the share of each of them.

3 [a] A map is drawn with a scale 1 : 1 000 000 Find the real distance between El-Fayoum and Beni Suef in kilometres if the map distance is 5 cm. (4)

[b] If the ratio of the production of 3 factories for a certain type of washing machines is 5 : 4 : 3 , and the production of the third factory is 3 600 washing machines.

Find the production of the first and the second factories.

4 A load of apple weighs 330 kg. is distributed among three merchants in which the share of first = $\frac{2}{3}$ the share of the second , and the share of the second = $\frac{1}{2}$ the share of the third , calculate the share of each of them from this load. (4)

5 A man died leaving 192 feddans of land to be distributed among his wife , 2 sons and 3 daughters , the share of the wife is $\frac{1}{8}$ of the whole land , and the share of the son is twice that of the daughter. (4)

Find the share of the wife and the share of each son and daughter.

Sheet 10

From lesson 1 unit 1
to lesson 5 unit 2

Total mark 20

1 ***Complete :*** 5

[a] The percentage is ....

[b] $\frac{6}{25}$ = ... %

[c] $1\frac{3}{4}$ = ... %

[d] 70 % = ... (in a fractional form)

[e] 1 – (35 % + 20 %) = ... %

2 ***Convert each of the following into a percentage :*** 4

[a] 0.07 [b] $\frac{3}{5}$

[c] $\frac{9}{20}$ [d] 0.6

3 If $\frac{x}{40}$ = 35 % , 3
find the value of x

4 [a] In a class , there are 48 pupils , if 6 of them are absent. 4
Find the percentage of absentees and also the percentage of attendance.

[b] An amount of money was distributed among Heba , Hend and Nada in the ratio 2 : 3 : 4 , if Nada's share is L.E.15 more than Heba's share. Find the total amount of the money.

5 [a] The monthly salary of an employee is L.E. 936 He saved L.E. 117 4
Find the percentage of what he saved to its salary.

[b] The real distance between Cairo and Banha is 40 km. and the distance between them on the map is 8 cm.
Find the drawing scale for this map.

Sheet 11

From lesson 1 unit 1
to lesson 6 unit 2

Total mark 20

1 *Choose the correct answer between brackets :* (5)

[a] $50\ \% + \frac{1}{5} =$ ………… % (55 or 70 or 45 or 10)

[b] If 9 , x , 24 and 32 are proportional quantities , then $x =$ …………
(12 or 15 or 3 or 6)

[c] 45 % of 300 pounds = ………… pounds
(45 or 35 or 150 or 135)

[d] If a merchant bought a TV set for L.E. 1 000 , then sold it for L.E. 1 200 , then the percentage of profit is ………… %
(20 or 30 or 15 or 45)

[e] Khaled bought a car in the price L.E. 60 000 and he sold it with profit 5 % , then the selling price of the car is L.E. …………
(61 000 or 62 000 or 63 000 or 65 000)

2 [a] A trader sold goods for L.E. 550 with a profit of 10 % (4)
Find the cost price of the goods.

[b] A piece of cloth of 10 metres long is put in water , it shrank by 5 % from its original length.Find its length after shrinking.

3 [a] The length of a road is 120 km. , it is wanted to pave the road in three months. If 42 % in the first month and 28 % in the second month. How many kilometres will be paved in the third month ? (4)

[b] Ramy deposited L.E. 3 000 in a bank with an interest 11%
Find the total amount after one year.

4 [a] The price of a TV set is L.E. 1 450 , in the sale , its price becomes L.E. 1 160 Find the percentage of the discount. (4)

[b] XYZ is a triangle in which XY : YZ : ZX = 4 : 5 : 7
and ZX = 28 cm. Find the perimeter of the triangle.

5 A trader bought some goods for L.E. 960 and spent L.E. 20 for transportation , then he sold it with profit 20 % (3)
Find the selling price.

Sheet 1

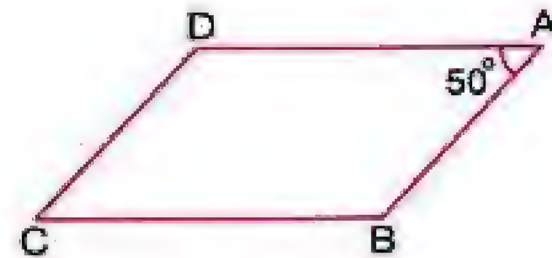
On lesson 1 unit 3

Total mark 20

1 ***Complete each of the following :*** (5)

[a] The two diagonals are equal in length in ………… and …………

[b] In the opposite figure :



ABCD is a parallelogram

, m (∠ A) = 50°

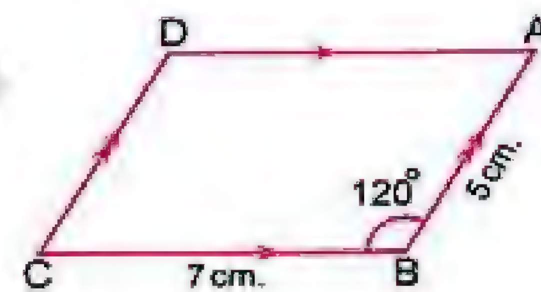
, then m (∠ B) = ………… °

[c] The rhombus is a parallelogram in which two adjacent sides are …………

[d] A parallelogram in which its diagonals are equal in length is called …………

[e] The shape that the two diagonals are perpendicular and equal in length is …………

2 ***In the opposite figure :*** (3)



ABCD is a parallelogram in which

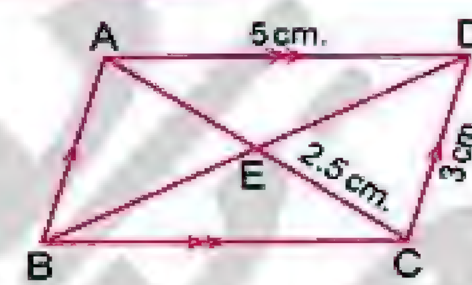
AB = 5 cm. , BC = 7 cm. ,

m (∠ ABC) = 120°

Without using geometrical instruments

Find : m (∠ ADC) , the length of $\overline{DC}$ and the length of $\overline{AD}$

3 ***In the opposite figure :*** (3)

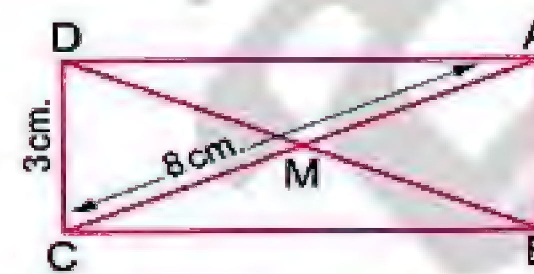


ABCD is a parallelogram in which

CD = 3 cm. , EC = 2.5 cm. , AD = 5 cm.

Find the length of each of : $\overline{AB}$, $\overline{BC}$ and $\overline{AC}$

4 ***In the opposite figure :*** (3)



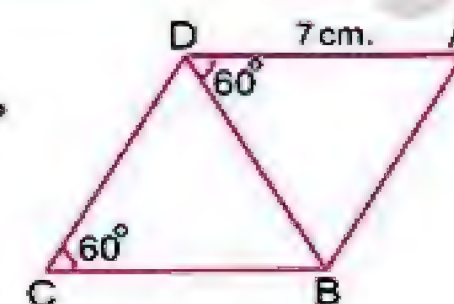
ABCD is a rectangle in which AC = 8 cm.

and CD = 3 cm.

Find : (1) Length of $\overline{BD}$

(2) The perimeter of Δ ABM

5 [a] ***In the opposite figure :*** (6)



ABCD is a parallelogram in which m (∠ C) = 60°

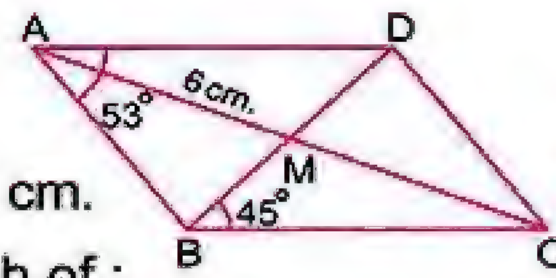
, m (∠ ADB) = 60° and AD = 7 cm.

Find : (1) m (∠ A) and m (∠ ABD)

(2) The type of the triangle ABD according to its sides

(3) The perimeter of the shape ABCD

[b] ***In the opposite figure :***



ABCD is a parallelogram in which

m (∠ BAD) = 53° , m (∠ DBC) = 45° , AM = 6 cm.

Calculate without using measuring tools each of :

(1) m (∠ ABD) (2) m (∠ ADC) (3) AC

Sheet 2

From lesson 1 unit 3
to lesson 2 unit 3

Total mark 20

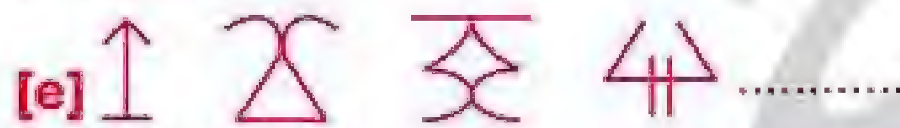
1 *Draw the next shape in each pattern in each of the following :* 5

[a]  ....

[b]  ....

[c]  ....

[d]  ....

[e]  ....

2 *Choose the correct answer between brackets :* 5

[a] The two diagonals are perpendicular and equal in length in ....

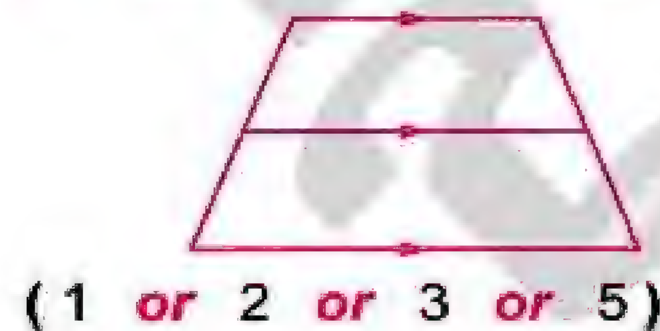
(rectangle *or* square *or* parallelogram *or* rhombus)

[b] △ □ ⬠ .... (in the same pattern)

(▭ *or* ⬡ *or* ⏢ *or* ◇)

[c] **In the opposite figure :**

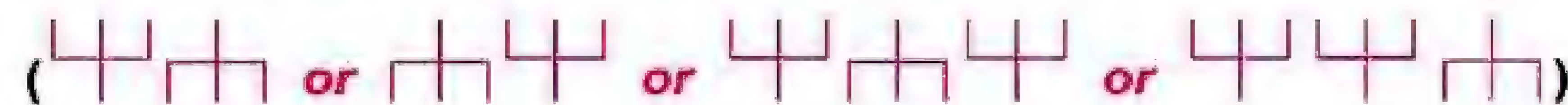
The number of trapezoids is ....



(1 *or* 2 *or* 3 *or* 5)

[d]  ....

(The description of the pattern is repetition of ....)



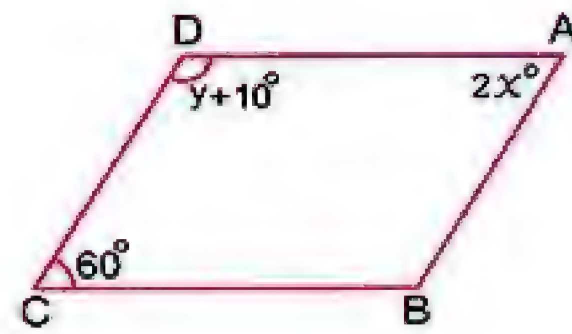
[e] If one angle in a parallelogram is right , then it is called ....

(trapezium *or* square *or* rectangle *or* rhombus)

3 [a] ***In the opposite figure :***

ABCD is a parallelogram then

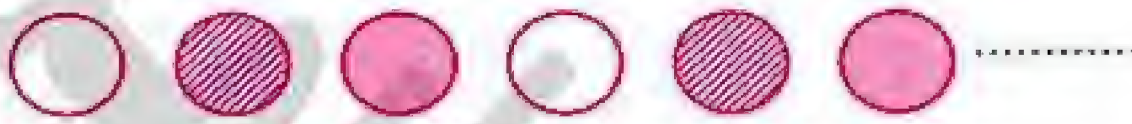
find the value of each of x and y





[b] Discover the following pattern

, then write its description :

 ....

(The description of the pattern is repetition of ....)

4 ***In the opposite figure :***

ABCD is a parallelogram in which m (∠ B) = 100° ,

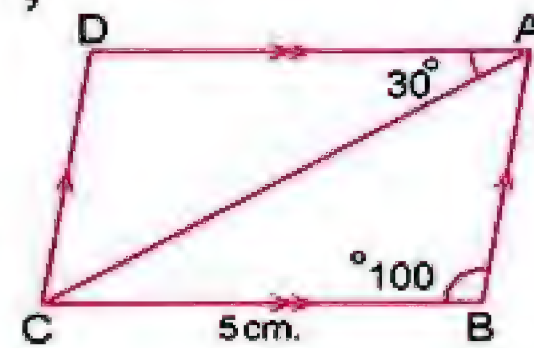
m (∠ CAD) = 30° and BC = 5 cm.

Find :

[a] m (∠ D)

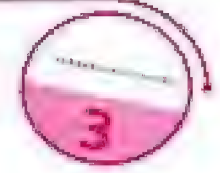
[b] m (∠ ACD)

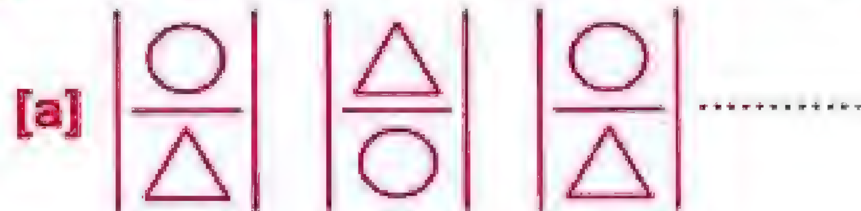
[c] The length of $\overline{AD}$



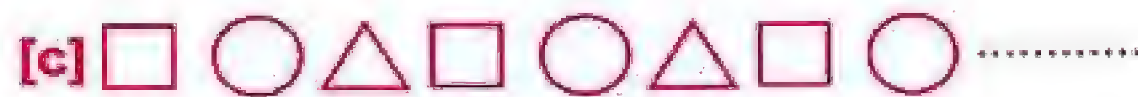


5 ***Complete in the same pattern :***



[a]  ....

[b]  ....

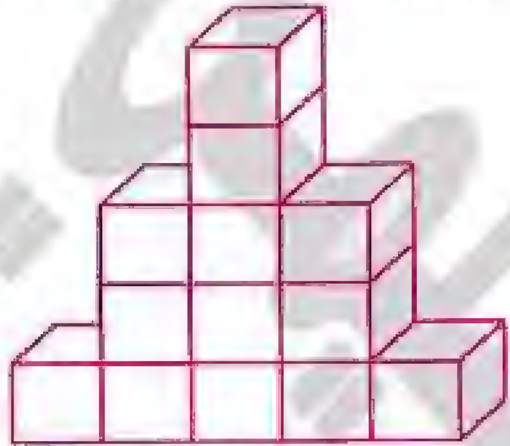
[c]  ....

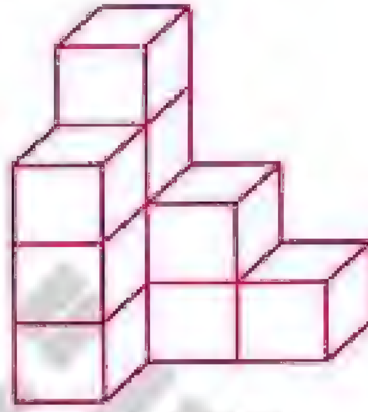
Sheet 3

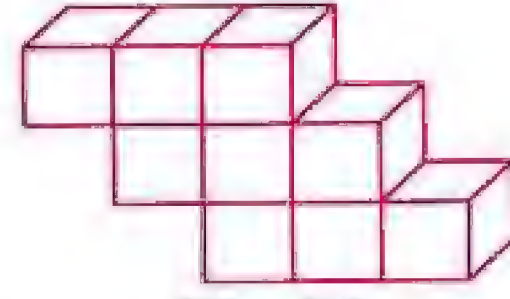
From lesson 1 unit 3
to lesson 3 unit 3

Total mark 20

1 *Find the volume of each of the following figures considering the unit of volume is cm^3 :* (3)


Fig. (1)
The volume = ... cm^3


Fig. (2)
The volume = ... cm^3


Fig. (3)
The volume = ... cm^3

2 *Complete each of the following :* (5)

[a] In the cuboid , each two opposite faces are .... and ....

[b] In the cube , there are .... edges and .... vertices.

[c] 17 m^3 = ... dm^3

[d] If the dimensions of a cuboid are equal in length , then it is called ....

[e] The cubic centimetre is ....

3 *Choose the correct answer between brackets :* (5)

[a] In the parallelogram , the sum of measures of any two consecutive angles = ...° (90 or 180 or 100 or 80)

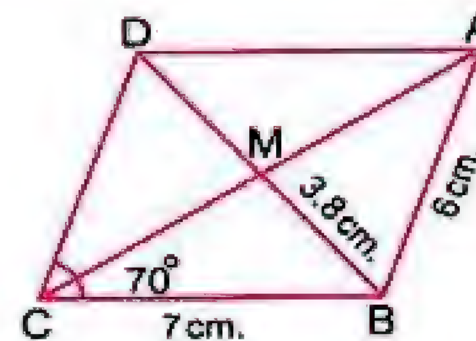
[b] Each of cube and cuboid has .... faces. (8 or 12 or 6 or 4)

[c] 3 250 mm^3 = ... cm^3 (3.25 or 32.5 or 0.325 or 325)

[d] 7 dm^3 = ... cm^3 (0.007 or 7 000 or 700 or 70)

[e] In the cube , all the edges are ....
(different in length or equal in length or parallel or intersecting)

4 *In the opposite figure :* (3)



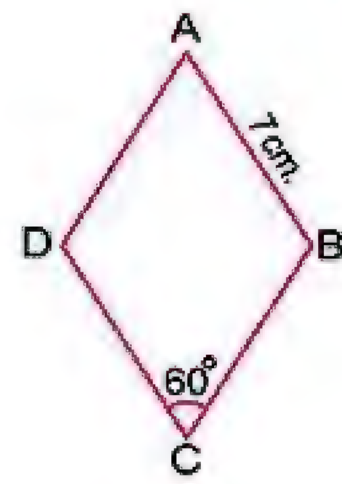
ABCD is a parallelogram in which AB = 6 cm. , BC = 7 cm. , BM = 3.8 cm. , m (∠ C) = 70°
Without using geometrical instruments , find :
m (∠ ADC) , the perimeter of Δ BCD



5 [a] ***Arrange each of the following ascendingly :***

$5\ m^3$, $500\ 000\ cm^3$ and $50\ dm^3$

[b] ***In the opposite figure :***



ABCD is a rhombus in which m (∠ BCD) = 60° ,

AB = 7 cm.

Find : (1) The perimeter of the figure ABCD

(2) m (∠ ABC)

Sheet 4

From lesson 1 unit 3
to lesson 4 unit 3

Total mark 20

1 Complete each of the following : (5)

[a] The volume of the cuboid = ………… × height

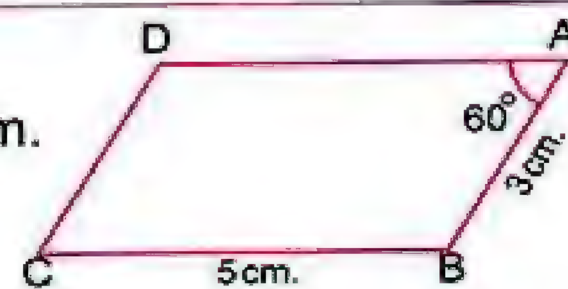
[b] The volume of the cuboid whose dimensions are 5 cm. , 6 cm. and 8 cm. is ………… cm^3

[c] The volume of a cuboid with base area 88 cm^2 and height 45 cm. is …………

[d] The base area of the cuboid = $\frac{\text{…………………}}{\text{…………………}}$

[e] The four angles are right in each of ………… and …………

2 [a] ***In the opposite figure :*** (4)



ABCD is a parallelogram which has AB = 3 cm. , BC = 5 cm. and m (∠ BAD) = 60°

(1) Find : m (∠ ABC)

(2) Calculate the perimeter of the parallelogram ABCD

[b] A cuboid-shaped box of dimensions 12 cm. , 6 cm. and 18 cm. was filled with pieces of sweets , each piece in the shape of a cuboid of dimensions 2 cm. , 1 cm. and 3 cm.
Find the number of the pieces that filled the box.

3 Choose the correct answer between brackets : (5)

[a] 6 500 dm^3 = ………… m^3 (6.5 or 65 or 650 or 6 500 000)

[b] If the volume of a cuboid is 1 800 cm^3 and its base dimensions are 30 cm. and 10 cm. , then its height = ………… cm.
(9 or 6 or 12 or 15)

[c] The number of faces of the cuboid is …………
(4 or 6 or 12 or 8)

[d] If a cuboid of volume 72 cm^3 , its height is 6 cm. and its length is 4 cm. , then its width = ………… cm. (12 or 9 or 6 or 3)

[e] Cubic decimetre is a unit for measuring …………
(length or volume or weight or area)

4 The sum of dimensions of a cuboid is 240 cm. and the ratio among them is 2 : 3 : 5 Find its volume. (3)

5 3 600 cm^3 of water was poured in a cuboid-shaped vessel with a square base of side length 20 cm. Find the height of water in the vessel. (3)

Sheet 5

From lesson 1 unit 3
to lesson 5 unit 3

Total mark 20

1 Complete : (5)

[a] The volume of the cube = ... × .... × ....

[b] A cube of edge length 6 cm. , its volume = ... cm^3.

[c] The area of one face of a cube is 9 cm^2. , then its volume = ... cm^3.

[d] If the sum of the lengths of the edges of a cube is 60 cm. , then its volume = ...

[e] If the perimeter of one face of a cube is 8 cm. , then the volume of this cube = ...

2 Choose the correct answer between brackets : (5)

[a] 10 dm^3. = ... cm^3. (10 or 100 or 1 000 or 10 000)

[b] The volume of a cuboid is 120 cm^3. , if its base area is 24 cm^2. , then its height = ... cm. (5 or 6 or 10 or 12)

[c] The number of vertices of a cube is .... (8 or 12 or 6 or 4)

[d] The parallelogram in which two adjacent sides are equal in length is called ....

(a square or a rectangle or a trapezium or a rhombus)

[e] A cuboid with a square base of side length 7 cm. and height 10 cm. , then its volume is ....

(49 cm^3. or 70 cm^2. or 70 cm^3. or 490 cm^3.)

3 (4)

[a] Which is greater ? The volume of a cube of edge length 5 cm. or the volume of a cuboid of dimensions 6 cm. , 5 cm. and 4 cm.

[b] A metal cuboid with dimensions 56 cm. , 21 cm. and 7 cm. was melted and converted into small cubes with edge length 14 cm. for each.

Calculate the number of these cubes.

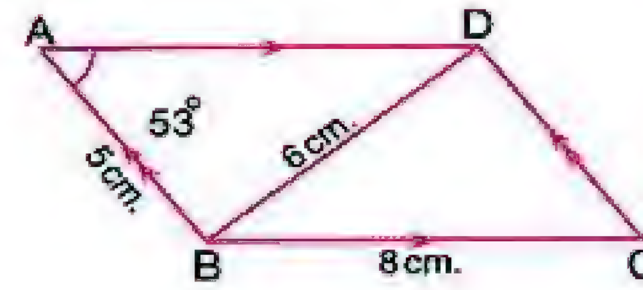
4 The inner dimensions of a cuboid-shaped box are 54 cm. , 60 cm. and 30 cm. , it is needed to put inside it cube-shaped packets of biscuits whose edge length is 6 cm. (2)

Find the number of packets of biscuits which fill the box.



5 ***In the opposite figure :***

ABCD is a parallelogram in which
m (∠ BAD) = 53° , AB = 5 cm.
, BC = 8 cm. and BD = 6 cm.
Find : **(1)** m (∠ BCD)
(2) The perimeter of Δ DBC



Sheet 6

From lesson 1 unit 3
to lesson 6 unit 3

Total mark 20

1 ***Complete :*** (5)

[a] The litre is a unit for measuring ....

[b] $4\frac{2}{5}$ litres = ... cm^3.

[c] 3 litres = ... dm^3.

[d] 0.45 m^3 = ... litres

[e] 680 litres = ... m^3.

2 ***Choose the correct answer between brackets :*** (5)

[a] The inner dimensions of a cuboid container is 20 cm. , 20 cm. and 30 cm. , its capacity = ... litres.
(0.12 or 1.2 or 12 or 120)

[b] $\frac{3}{4}$ litre = ... mL. (0.75 or 7.5 or 750 or 75)

[c] Decimetre is a unit for measuring ....
(capacity or volume or length or weight)

[d] 38 millilitres = ... cm^3. (38 000 or 3 800 or 380 or 38)

[e] The two diagonals are perpendicular in ....
(rectangle or rhombus or parallelogram or trapezium)

3 (4)

[a] A tin in the shape of a cuboid of internal dimensions are 30 cm. , 25 cm. and 40 cm. is filled with oil. Find the price of the oil if the price of one litre is L.E. 3.5

[b] A cube-shaped tin of inner edge length 40 cm. is full of oil. It is needed to put the oil in a number of bottles each of capacity half a litre. How many bottles are needed ?

4 (3)

[a] The capacity of a bottle is $\frac{3}{4}$ litres , is filled with alkohol. It is wanted to put this amount in small bottles which the capacity of each is 25 cm^3. Find the number of small bottles.

[b] 3.6 litres of water are poured in a cuboid-shaped vessel with a square-base of side length 20 cm. Find the height of water in the vessel.

5 (3)

[a] A building worker used 1 500 bricks to build a wall. Calculate the volume of the wall in m^3. if the brick is in the shape of a cuboid of dimensions 0.25 m. , 0.12 m. and 0.06 m.

[b] Find the volume of cube whose edge length is equal to the side length of an equilateral triangle of perimeter 18 cm.

Sheet 7

From lesson 1 unit 3
to lesson 1 unit 4

Total mark 20

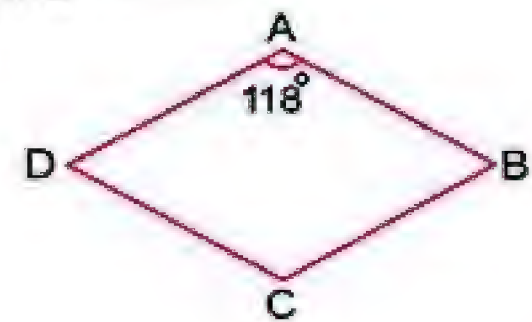
1 ***Complete each of the following :*** (5)

[a] The data that describe the conditions of individuals using words is called ....

[b] The data that consists of numbers to represent a certain phenomenon is called ....

[c] If the dimensions of a cuboid are equal , then it is called a ....

[d] ***In the opposite figure :***



ABCD is a rhombus in which m (∠ A) = 118°

, then m (∠ B) = ...°

[e] The birth date is .... data.

2 ***Choose the correct answer between brackets :*** (5)

[a] The opposite data are descriptive except ....

(the favorite colour *or* birth place *or* age *or* blood species)

[b] The opposite data are quantitative except ....

(length *or* weight *or* age *or* blood species)

[c] If the edge length of a cube = 4 cm. , then its volume = ... cm^3.

(6 *or* 8 *or* 24 *or* 64)

[d] The volume of the cuboid is 36 cm^3 , with its base is square shaped of side length 3 cm. , then its height = ... cm.

(108 *or* 12 *or* 9 *or* 4)

[e] 850 millilitres = ... litres.

(0.85 *or* 85 *or* 0.085 *or* 850 000)

3 Read the written data on the opposite bottle , then classify them into descriptive data and quantitative data. (2)



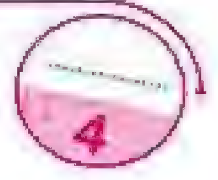
4 The base of cuboid is a rectangle whose perimeter = 80 cm. and the ratio between its length to its width = 5 : 3 , calculate its volume if its height is 7 cm.

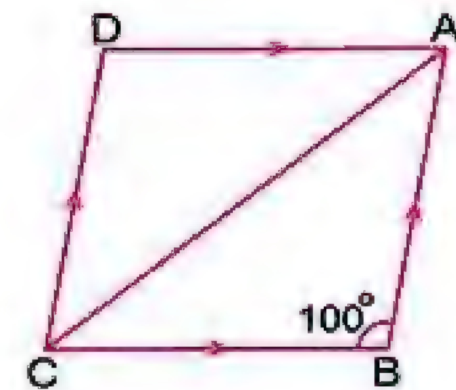


5 [a] The opposite card is a membership card of a library , answer :

(1) What are the quantitative data ?

(2) What are the descriptive data ?





[b] ***In the opposite figure :***

ABCD is a parallelogram in which

m (∠ BAC) = m (∠ DAC) , m (∠ B) = 100°

Find : (1) m (∠ D)

(2) m (∠ BAC)

D A C B 100°

Sheet 8

From lesson 1 unit 3 to lesson 2 unit 4

Total mark 20

1 Bassem wants to know the favourite sport for the students in his classroom. (4)

The number of students is 36 students.

He asked everyone , the answers were :

(Volleyball - football - football - swimming - tennis - football - walking - swimming - volleyball - walking - football - tennis - football - football - gymnastics - walking - tennis - tennis - swimming - football - swimming - walking - football - walking - tennis - basketball - swimming - swimming - football - basketball - football - walking - swimming - football - football - swimming)

[a] Form a frequency table for this data.

[b] What is the number of pupils who prefer tennis ?

2 ***The following table shows the produced amount of vegetables in tons by a farm in a year :*** (4)

Vegetable	Tomato	Eggplant	Green beans	Potato	Cucumber	Total
No. of tons	20	14	5	25	16	80

[a] Which is the vegetable that has the greatest number of produced tons ? and what is the order of it among the produced vegetables if you arrange them according to the produced amount of each kind ascendingly ?

[b] How many tons of tomato are produced ? And what is the percentage of it ?

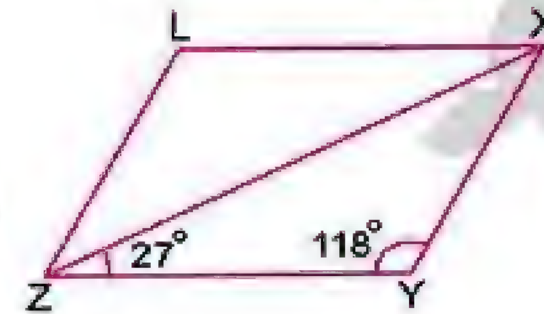
3 [a] ***In the opposite figure :*** (4)

XYZL is a parallelogram in which

m (∠ Y) = 118° , m (∠ XZY) = 27° , find :

(1) m (∠ YXZ) (2) m (∠ LZX)

(3) m (∠ LXZ) (4) m (∠ L)



[b] A metallic cube is of edge length 30 cm. , it is melted to be use in manufacture and it is converted into cuboid in which the dimensions of the base are 40 cm. and 25 cm. Calculate its height.

4 ***Here are the evaluations of 20 students in mathematics :***

good	pass	pass	good	weak
excellent	very good	pass	very weak	very good
good	weak	good	pass	pass
good	pass	weak	good	pass

[a] Form a frequency table of this data.

[b] What is the most common evaluation among the students ?

[c] What is the least common evaluation among the students ?

5 [a] If the capacity of a tank in the shape of cuboid is 24 000 litres.
Find the area of the base if the height is 3 metres.

[b] Which is greater in volume ?
A cube of edge length 9 cm. or a cuboid with dimensions 8 cm. , 9 cm. and 10 cm.

Sheet 9

From lesson 1 unit 3
to lesson 3 unit 4

Total mark 20



1 ***Complete each of the following :***

[a] The difference between the greatest value and the smallest value in a set of individuals is called ....

[b] If the marks of 4 pupils in a test are 26 , 30 , 13 and 29 , then the range of these marks = ...

[c] If the values of a frequency distribution lie between 10 and 60 , then the range of this distribution = ...

[d] If one of the angles of a parallelogram is right , then it will be called ....

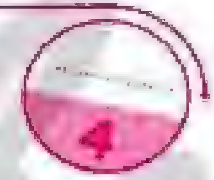
[e] A cuboid with a square base of side length 4 cm. and height 5 cm. , then its volume = ... cm^3



2 ***The following data shows the number of holidays that 40 workers of a factory have got during a year :***

12	27	14	25	13	22	14	26	11	15
30	21	15	22	23	28	16	21	30	25
27	16	22	20	26	30	21	15	16	23
15	30	28	21	24	15	27	30	21	28

Form a frequency table by using the sets 11 – , 16 – , 21 – , ... , the length of each is 5 days , then find the number of workers who have got 21 days or more in the year.



3 ***The following table gives the frequency distribution of the daily wages in L.E. for 50 workers :***

Set of wages	10 –	12 –	14 –	16 –	18 –	20 –	22 –
No. of workers	6	7	12	10	9	4	2

[a] Find the number of workers whose wages are less than L.E. 16

[b] What is the percentage of workers whose wages are L.E. 20 or more ?



4 ***The following table gives the frequency distribution of the marks of 40 pupils in mathematical examination :***

Sets	10 –	20 –	..... –	40 –	50 –	Total
Frequency	4	8	12	10	.....	40

[a] Complete the table.

[b] Find the number of pupils whose marks are less than 40 and its percentage.

5 [a] A cubic glass vessel , its inner edge length is 20 cm. This vessel contains an amount of water. If we throw a metallic piece in it then the water level raised 3 cm. because of that.
Find the volume of the metallic piece.

[b] A cube-shaped vessel , its internal edge length is 20 cm. It is filled with cooking oil :

(1) Calculate the capacity of the vessel.

(2) If the price of one litre of cooking oil is 14 pounds , calculate the price of all the cooking oil.

Sheet 10

From lesson 1 unit 3
to lesson 4 unit 4

Total mark 20

1 ***The following table gives the frequency distribution of the ages of 40 students in a school :*** (3)

The age	6 –	8 –	10 –	12 –	14 –	Total
Number of students	8	9	6	12	5	40

Draw the frequency curve for this distribution.

2 ***The following table shows the marks of 100 pupils in maths :*** (4)

Marks	20 –	30 –	40 –	50 –	Total
Number of pupils	15	30	40	15	100

[a] What is the number of the pupils who got less than 40 marks ?

[b] Draw the frequency curve for this distribution.

3 ***Complete each of the following :*** (5)

[a] A parallelogram is a rhombus when its two diagonals are ....

[b] 0.3 litre = ... millilitres.

[c]  ....

[d] If the range of frequency distribution is 23 and the lowest value is 35 , then the highest value is ....

[e] The centre of the set which its lower limit = 4 and its upper limit = 10 is ....

4 [a] The sum of areas of all faces of a cube is 54 cm^2. Calculate its volume. (4)

[b] 72 litres of molasses are needed to be put in tins of the same kind , each has a rectangular-shaped base with dimensions 18 cm. and 10 cm. , and height 16 cm. How many tins are needed ?

5 ***The following table shows the ages of visitors to an exhibition within an hour of the day :*** (4)

Visitor's age	10 –	20 –	30 –	40 –	50 –	Total
Number of visitors	6	9	12	10	8	45

(1) What is the number of visitors whose ages are less than 40 years ?

(2) Draw the frequency curve for this distribution.

SUMMARY OF THE FIRST TERM

Summary of Unit One

The meaning of ratio : A ratio is a way of comparing between two quantities by division.

The properties of ratio

Property 1

The ratio has the same properties of the **fraction as reduction , simplifying** and **comparison.**

Property 2

In its simplest form , the two terms of the ratio should be two **whole numbers as small as possible.**

Property 3

To compare two quantities using ratio , they must have the same unit.

Property 4

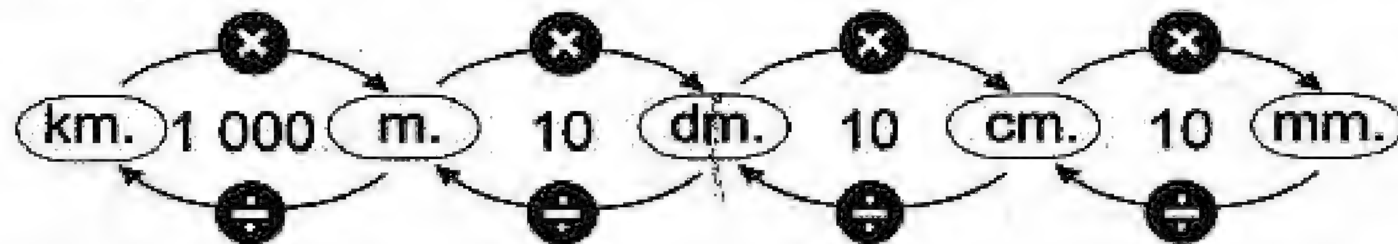
The ratio between two quantities has no units.

Remarks

1. In an equilateral triangle, the ratio of the side length to the perimeter is 1 : 3
2. In a square, the ratio of the side length to the perimeter is 1 : 4
3. In a rhombus, the ratio of the side length to the perimeter is 1 : 4
4. In a square, the ratio of any side length to another side length is 1 : 1
5. In a rhombus, the ratio of any side length to another side length is 1 : 1
6. In a circle, the ratio of the diameter length to the circumference is $2r : 2\pi r$ (which equals $1 : \pi$)
7. In a circle, the ratio of the radius length to the circumference is $r : 2\pi r$ (which equals $1 : 2\pi$)

Measuring units and their converting rules

The length units



For example :

- 5 km. = 5 × 1 000 = 5 000 m.
- 6 000 cm. = 6 000 ÷ 100 = 60 m.

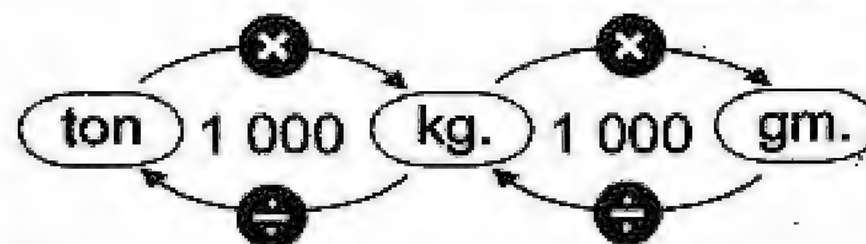
The area units



For example :

- 3 km² = 3 × 1 000 000 = 3 000 000 m²
- 1 000 cm² = 1 000 ÷ 100 = 10 dm²

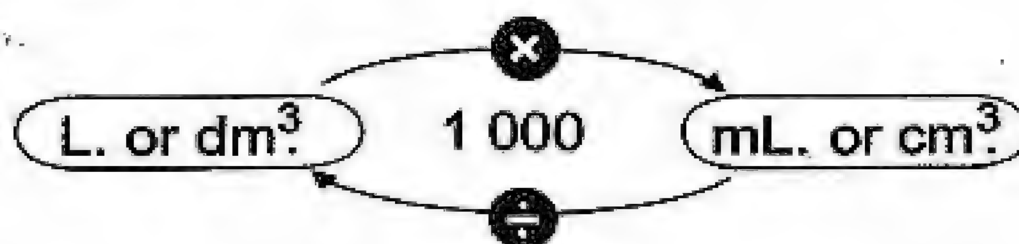
The weight units



For example :

- 6 kg. = 6 × 1 000 = 6 000 gm.
- 20 000 kg. = 20 000 ÷ 1 000 = 20 tons

The capacity units

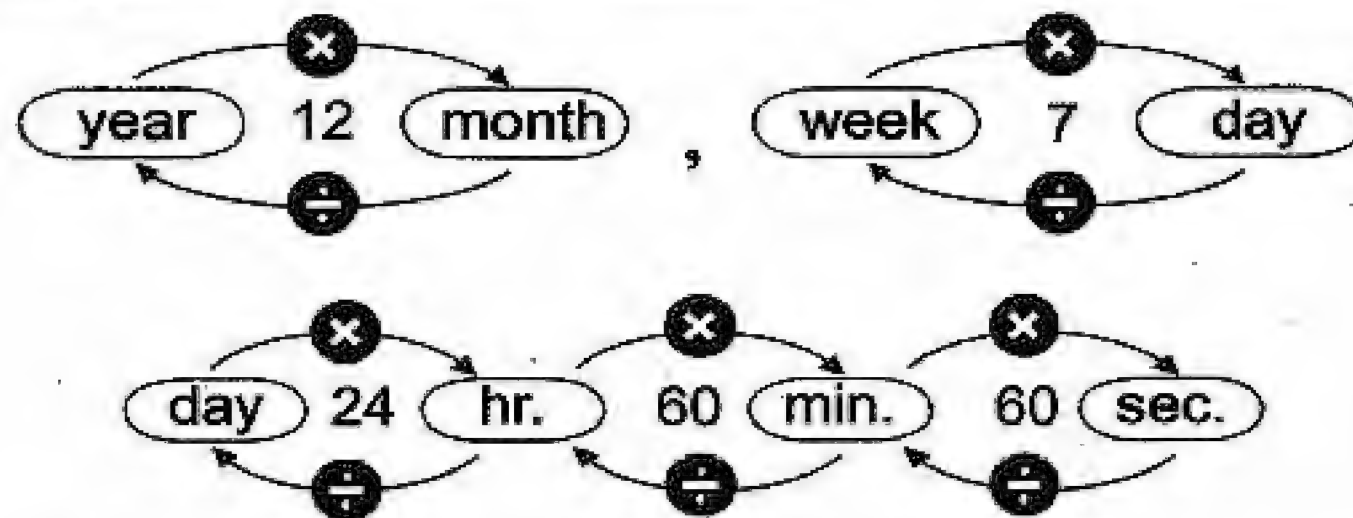


For example :

- 5 L. = 5 × 1 000 = 5 000 cm³
- 7 000 cm³ = 7 000 ÷ 1 000 = 7 L.

Summary

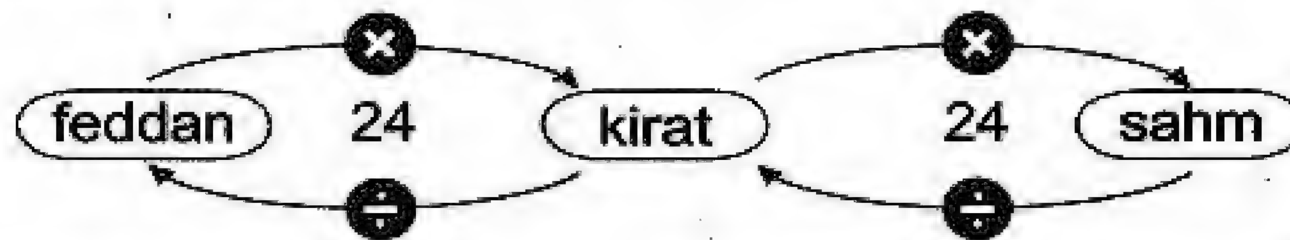
The time units



For example :

- 5 hr. = 5 × 60 = 300 min.
- 49 days = 49 ÷ 7 = 7 weeks

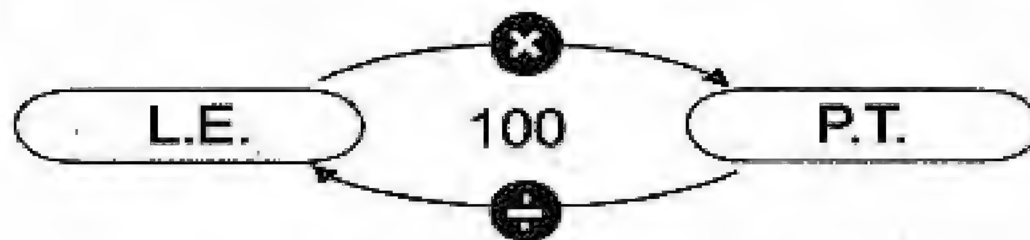
Units of cultivated lands



For example :

- 2 feddans = 2 × 24 × 24 = 1152 sahms
- 120 kirats = 120 ÷ 24 = 5 feddans

The money units



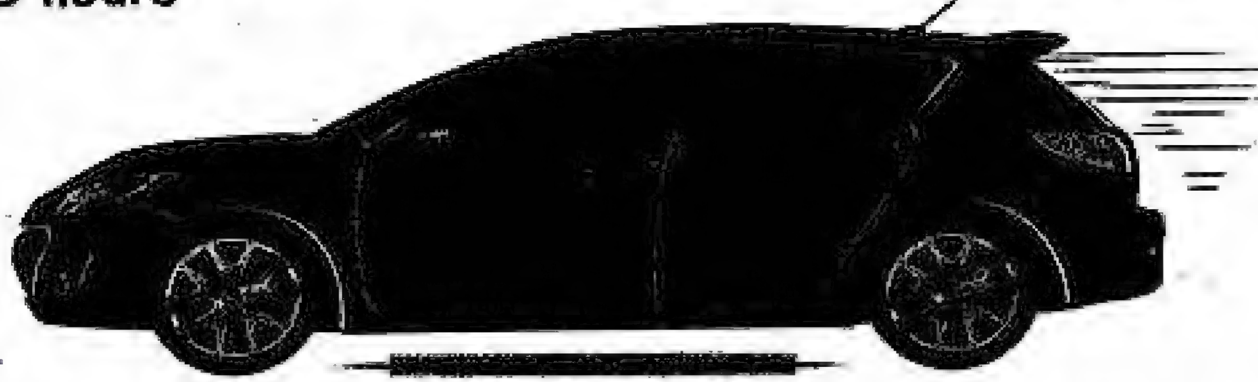
For example :

- L.E. 50 = 50 × 100 = P.T. 5 000
- P.T. 1 000 = 1 000 ÷ 100 = L.E. 10

A rate is a ratio of two quantities with different measurement units.

For example : If a car travels **300 km.** in **5 hours**, the rate is

$\frac{300 \text{ km.}}{5 \text{ hours}}$ (km. and hour are different measurement units).



- The rate per 1 hour is $\frac{300 \text{ km.}}{5 \text{ hours}} = \frac{60 \text{ km.}}{1 \text{ hour}}$ = 60 km./hr.

Summary of Unit Two

Proportion is an equality of two or more ratios.

The properties of proportion

Property 1

If we multiply (or divide) each of the two terms of a ratio by the same non-zero number , then the resultant ratio is equal to the first ratio and they together form a proportion.

Property 2

The product of extremes = the product of means

$$\text{Drawing scale} = \frac{\text{Length in drawing}}{\text{Length in reality}}$$

Notice That

Both lengths should have the same units.

Remarks

If the drawing scale is

- Less than 1 (< 1)
  then it refers to minimization (reduction)
  (length in drawing $<$ length in reality
- Greater than 1 (> 1)
  then it refers to enlargement (magnification)
  (length in drawing $>$ length in reality)

Proportional division is to divide anything (money , land , weights , ...) according to a given ratio.

- A **percentage** is a ratio its second term is 100
- A **percentage** means "**per hundred**" or "**hundredths**".

Profit = selling price (S.P.) – cost price (C.P.)

The percentage of profit = $\frac{\text{Profit}}{\text{C.P.}} \times 100\ \%$

Loss = cost price (C.P.) – selling price (S.P.)

The percentage of loss = $\frac{\text{Loss}}{\text{C.P.}} \times 100\ \%$

Notice that :

The cost price = buying price + expenditures (where expenditures may be maintenance , transportation , insurance , rentals , ... etc.)

Remarks

① When we say that the **profit** is 20 % , we mean that :
If the **cost** price (C.P.) = L.E. 100 , then the **profit** = L.E. 20 and the **selling** price (S.P.) = L.E. 120

② When we say that the **loss** is 15 % , we mean that :
If the **cost** price (C.P.) = L.E. 100 , then the **loss** = L.E. 15 and the **selling** price (S.P.) = L.E. 85

③ When we say that the **interest** is 8 % , we mean that :
If we **deposit** L.E. 100 in a bank , then the **interest** = L.E. 8 and the **amount of this money after one year** = L.E. 108

④ When we say that the **discount** is 25 % , we mean that :
If the **price before the discount** (The marked price) is L.E. 100 , then **the discount** = L.E. 25 and the **price after the discount** (The discount price) is L.E. 75

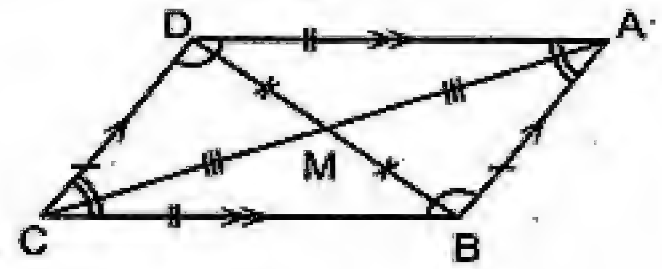


Summary of Unit Three

- The parallelogram : is a quadrilateral in which each two opposite sides are parallel.
- The rectangle : is a parallelogram with a right angle.
- The rhombus : is a parallelogram in which two adjacent sides are equal in length.
- The square : is a parallelogram with a right angle and two adjacent sides are equal in length.

Properties of the parallelogram

1. Each two opposite sides are equal in length.
2. Each two opposite angles are equal in measure.
3. The sum of measures of each two consecutive angles is 180°
4. The two diagonals bisect each other.



A parallelogram is

a rectangle

If :
- One of its angles is right.

or

- Its two diagonals are equal in length.

a rhombus

If :
- Two adjacent sides are equal in length.

or

- Its two diagonals are perpendicular.

a square

If :
- One of its angles is right and two adjacent sides are equal in length.

or

- One of its angles is right and its diagonals are perpendicular.

or

- The two diagonals are equal in length and perpendicular.

or

- Two adjacent sides are equal in length and its diagonals are equal in length.

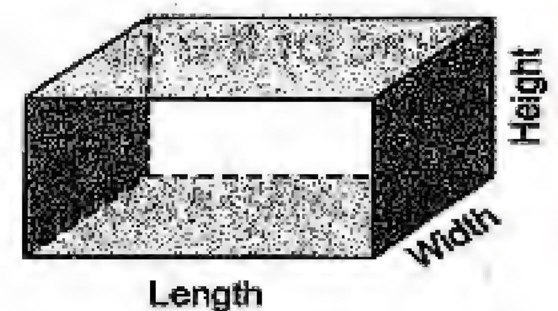
A pattern : is a sequence of symbols or figures arranged according to a certain system or rule.

Pattern unit : In visual patterns , usually you can find a unit which is repeated several times.

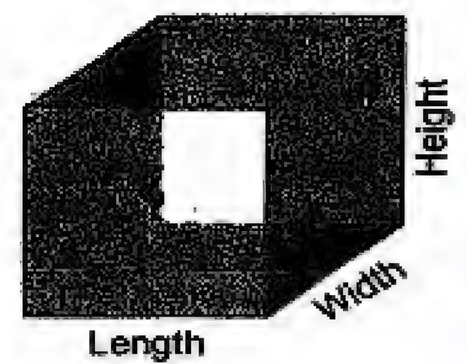
Solids

Any object that occupies a room in the space is called a solid.

- **The cuboid** has **12** edges , **8** vertices , **6** faces. and **3** dimensions : **length** , **width** and **height**.



- **The cube** has **12** edges , **8** vertices , **6** faces all these faces are congruent squares and **3** equal dimensions.

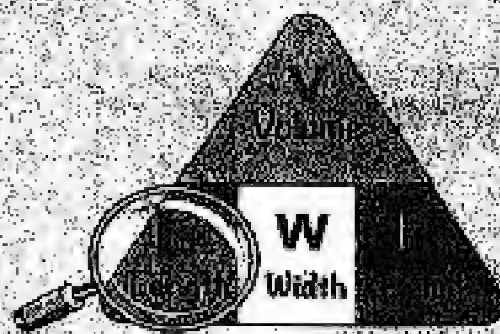


The number of **units** which a solid consists of is called the volume of the solid.

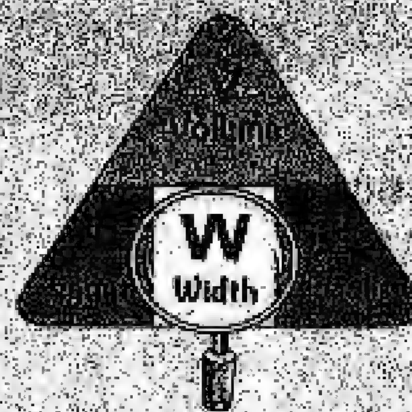
Volume of the cuboid



$V = L \times W \times H$



$L = \frac{V}{W \times H}$

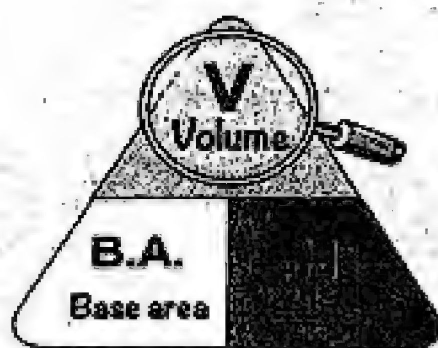


$W = \frac{V}{L \times H}$

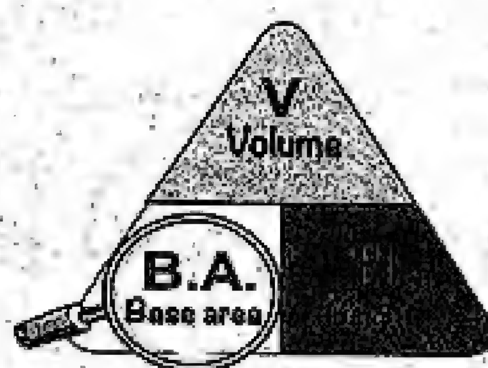


$H = \frac{V}{L \times W}$

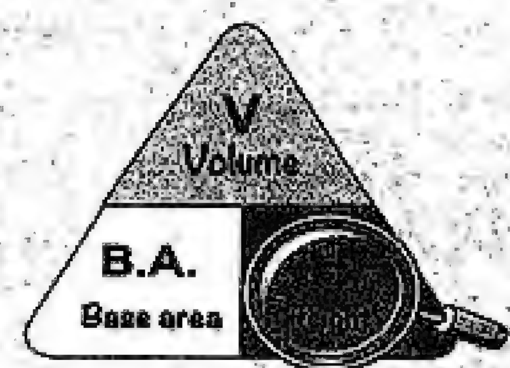
Summary



$V = B.A. \times H$



$B.A. = \frac{V}{H}$



$H = \frac{V}{B.A.}$

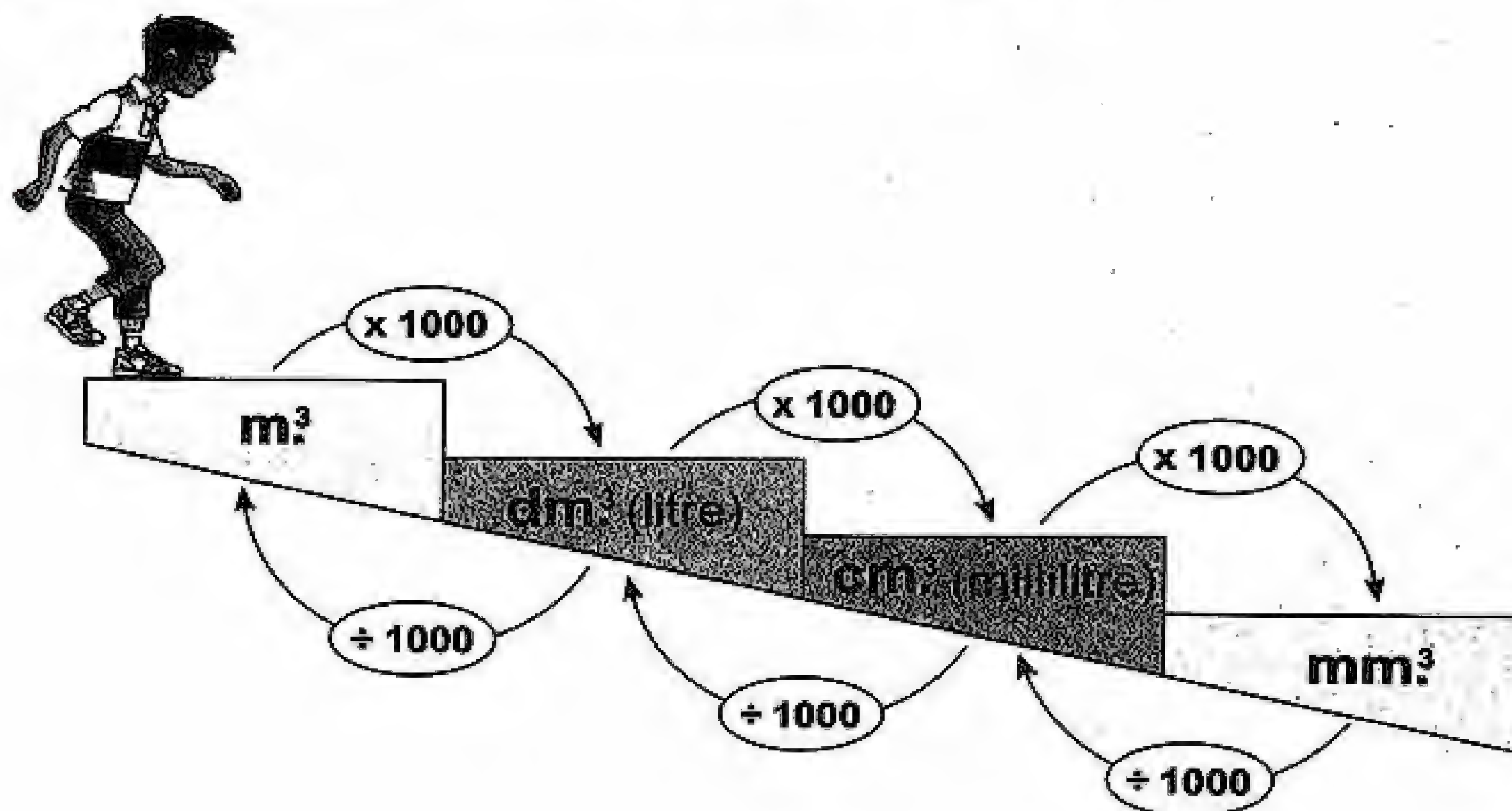
Volume of the cube

Volume of the cube = edge length × itself × itself

The capacity : It is the volume of the inner space of a hollow solid.

The litre (L.) and millilitre (mL.) are two units for measuring capacity or the volume of liquids.

The relation between the units of volume



Summary of Unit Four

Kinds of statistical data

1 Descriptive data :

These are data written in the form of **discription of the case** of the persons in the society **as** : name , qualification , gender , marital status , ...

2 Quantitative data :

These are data written in the form of **numbers** to express a certain phenomenon **as** : age , weight , height

Remarks

1. The difference between the maximum and the minimum value of the given data is called **the range of this data.**
2. The difference between the upper limit and the lower limit of the set is called **the length of this set.**
3. To find the number of sets, we find the quotient of $\frac{\textbf{the range}}{\textbf{the length of the set}}$

   If the quotient is a mixed number, we take the next whole number.
4. Centre of the set = $\frac{\textbf{lower limit + upper limit}}{\textbf{2}}$

Summary

Representing the statistic data by the frequency curve

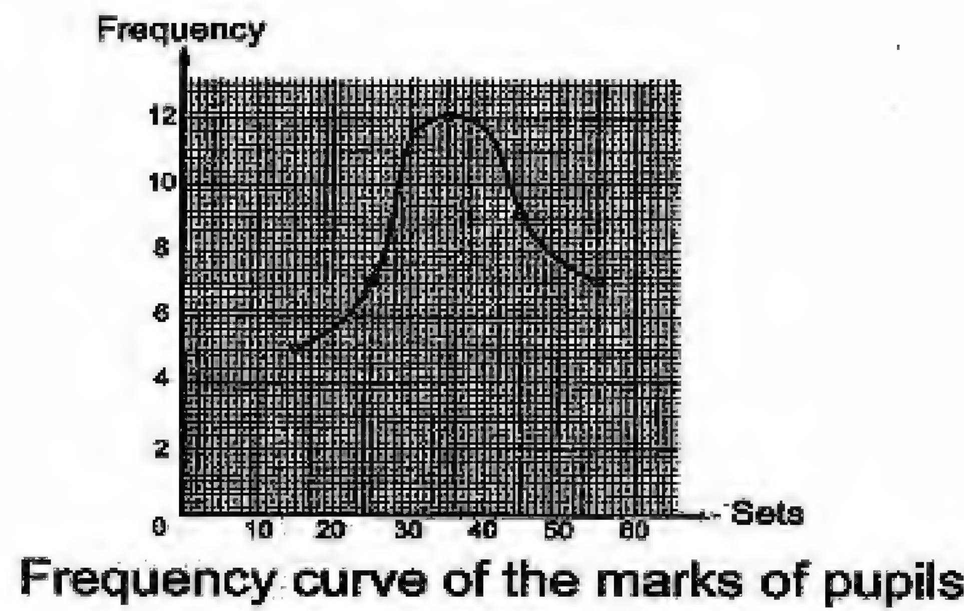
For Example

The following table shows the frequency distribution of marks of 40 pupils in the mathematics exam :

Sets	10 –	20 –	30 –	40 –	50 –	Total
Frequency	5	7	12	9	7	40

Represent these data by the frequency curve.

Solution



Frequency curve of the marks of pupils

FINAL EXAMINATIONS



- Model Examinations of the School Book
  (2 models + model for the special needs students)
- 20 Examinations from Some Governorates for the Year 2020
- 25 Examinations from Some Governorates for the Year 2017
- 5 Examinations from Some Governorates for the Year 2016

Model Examinations of the School Book

Model 1

Answer the following questions :

1 ***Complete the following statements :***

(1) 1.5 litre + 0.5 dm^3 + 500 cm^3 = ... litres.

(2) The volume of a cuboid is 64 cm^3 and the area of its base is 16 cm^2, then its height = ... cm.

(3) If the real length of an insect is 0.3 mm. and its length in a picture is 4.5 cm. , then the drawing scale = ...

(4) The area of the triangle = $\frac{1}{2}$ × .... × ....

2 ***Choose the correct answer :***

(1) The range of the set of values : 7 , 3 , 6 , 9 and 5 is ....

(2 or 4 or 6 or 12)

(2) $\frac{3}{4}$ = ... (in decimal form) (0.2 or 0.5 or 0.25 or 0.75)

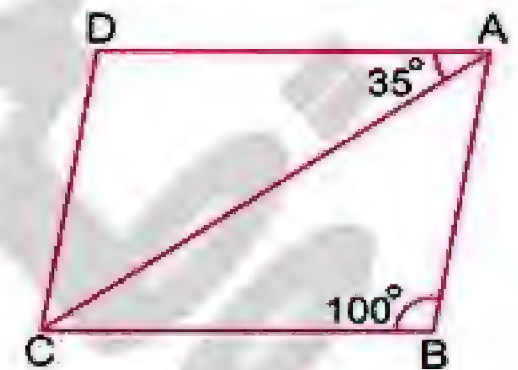
(3) An agricultural tractor ploughs 28 feddans in 4 hours , then the time which is needed to plough 42 feddans is .... hours.

(4 or 6 or 7 or 8)

(4) **In the opposite figure :**

ABCD is a parallelogram. , then

m (∠ ACD) = ...°



(35 or 45 or 100 or 180)

3 [a] A container has 12 litres of oil , it is wanted to put them in smaller bottles the capacity of each of them is 400 cm^3 Calculate the number of bottles which are needed.

[b] If the buying price of electric sets is L.E. 72 000 and sold at 12 % profit. Calculate the selling price.

4 **[a]** The ratio among the measures of the angles of a triangle is 2 : 3 : 4
Find the measure of each angle in this triangle.

[b] A metallic cube of edge length 12 cm. It needs to be converted it into ingots in the shape of cuboid each of them of dimensions 3 cm. , 4 cm. and 6 cm. Calculate the number of ingots that are obtained.

---

5 **[a]** Two persons started a commercial business , the first paid L.E. 5 000 and the second paid L.E. 8 000 , at the end of the year , the net profit was L.E. 3 900 Calculate the share of each of them from the profit.

[b] ***The following table shows the marks of 100 students in one month in math test :***

Marks	10 –	20 –	30 –	40 – 50	Total
Number of students	15	30	40	15	100

Draw the frequency curve of this distribution.

Model 2

Answer the following questions :

1 ***Choose the correct answer :***

(1) If one angle of a parallelogram is right , then it is called a ....
(rectangle *or* square *or* rhombus *or* cube)

(2) $\frac{24}{5}$ = ... ($4\frac{1}{5}$ *or* $3\frac{2}{5}$ *or* $4\frac{4}{5}$ *or* $2\frac{4}{5}$)

(3) If the marks of 6 students in one exam are 29 , 33 , 57 , 40 , 36 and 49 , then the range of these marks = ... (32 *or* 33 *or* 28 *or* 86)

(4) If $\frac{4}{6} = \frac{12}{x}$, then $x + 2$ = ... (16 *or* 18 *or* 20 *or* 22)

---

2 ***Complete the following statements :***

(1) 65 dm^3 = ... litres.

(2) A wooden box in the form of a cube , its external volume is 1 000 cm^3 and its capacity is 729 cm^3 , then the volume of wood of the box = ... cm^3

(3) The following table shows the marks of 50 students in one month in math :

Marks	10 –	20 –	30 –	40 – 50	Total
Number of students	5	15	20	10	50

then the number of students whose marks are less than 40 is .... students.

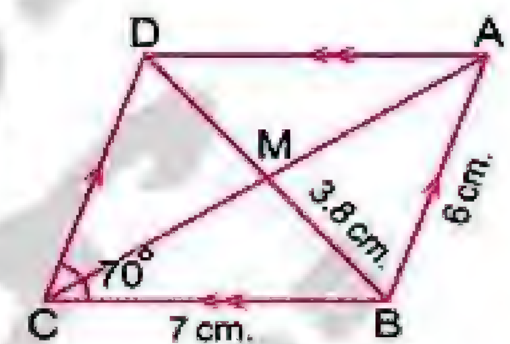
(4) If the height of the fence of the villa in the design is 5 cm. and its real height is 6 metres , then the drawing scale is .... : ....

3 [a] Three persons started in business , the first paid 15 000 pounds , the second paid 25 000 pounds and the third paid 20 000 pounds , at the end of the year , the profit was 5 520 pounds.
Calculate the share of each of them.

[b] 10 litres of water were poured in a vessel in the shape of a cuboid , its base is a square of side length 25 cm. Find the height of the water in the vessel.

4 [a] In one of our schools , there are 360 students , if the ratio between the number of boys and the number of girls is 1 : 2
Find each of the number of boys and girls.

[b] ***In the opposite figure :***



ABCD is a parallelogram in which AB = 6 cm.
, BC = 7 cm. , BM = 3.8 cm. , m (∠ C) = 70°
Without using geometrical instruments.
Find : m (∠ ADC) , the perimeter of Δ BCD

5 [a] Heba bought a mobile phone for 660 pounds with a discount 15 %
Calculate the price of the mobile phone before the discount.

[b] The following table shows the number of hours which are spent by 40 pupils to study their lesson daily :

Number of hours	1 –	2 –	3 –	4 –	5 – 6	Total
Number of pupils	6	3	8	12	11	40

Represent these data by the frequency curve.

Model for the special needs students

Answer the following questions :

1 *Complete the following statements :*

(1) 5 000 grams : 8 kilograms = ... : .... (in the simplest form)

(2) $\frac{3}{10}$ = ... %

(3) The volume of a cuboid = the area of base × ....

(4) 3 litres = ... cm^3

2 *Choose the correct answer :*

(1) The range of the values 50 , 25 , 35 and 20 is ....

(10 *or* 20 *or* 30)

(2) If $\frac{2}{3} = \frac{10}{x}$, then x = ... (6 *or* 15 *or* 20)

(3) The diagonals are perpendicular in ....

(rectangle *or* square *or* parallelogram)

(4) If the real length is 6 m. and the drawing length is 6 cm. , then the drawing scale is .... (1 : 10 *or* 1 : 1 000 *or* 1 : 100)

3 *Choose from column (A) to the suitable one from column (B) :*

A	B
(1) The cube has .... edges.	minimization
(2) If the drawing scale < 1 , this expresses	12
(3) The ratio between the side length of the square and its perimeter = ...	90°
(4) All of angles of the rectangle are equal in measure and the measure each of any of them = ...	1 : 4

4 ***Put true (✓) or false (✗) :***

(1) The numbers 1 , 2 , 6 and 12 are proportional. ( )

(2) If the percentage of boys is 35 % from the total of the number of pupils in a class , then the percentage of girls is 20 % ( )

(3) The favorite colour is a descriptive data. ( )

(4) The volume of a cube of edge length 3 cm. = 9 cm^2 ( )

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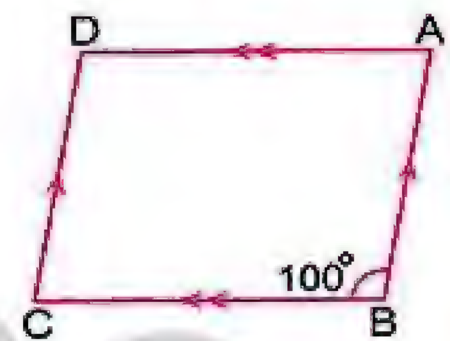
5 [a] ***Complete the following statements :***

(1) If A : B = 2 : 3 , B : C = 3 : 5 , then A : C = ... : ....

(2) **In the opposite figure :**

ABCD is a parallelogram , then

m (∠ D) = ...°



[b] ***The following table shows the marks of 50 students in one month in maths :***

Marks	10 –	20 –	30 –	40 – 50	Total
Number of students	6	10	20	14	50

Complete :

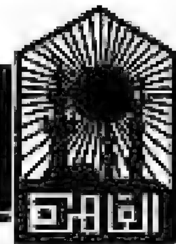
(1) The number of students whose marks are less than 20 = ... students.

(2) The number of students whose marks are 40 or more = ... students.





Some School's Examinations from Different Governorats 2020



1 Cairo Governorate

Nasr City Edu. Administration
St. George's College

Answer the following questions :

1 Choose the correct answer :

(1) If the ratio among the measurements of the angles of the triangle is 3 : 4 : 5 , then the measure of the greatest angle = ...
(90° *or* 75° *or* 60° *or* 55°)

(2) 16 : 48 = ... : .... (1 : 2 *or* 1 : 4 *or* 1 : 5 *or* 1 : 3)

(3) 5.7 litres = ... cm^3 (5.7 *or* 570 *or* 5 700 *or* 57)

(4) 3 , 4 , x and 12 are proportional quantities , then x = ...
(9 *or* 5 *or* 7 *or* 8)

(5) The two diagonals are equal in length and perpendicular in ....
(parallelogram *or* square *or* rectangle *or* rhombus)

(6) $\frac{2}{5}$ = ... % (20 *or* 30 *or* 40 *or* 50)

(7) The range of the values 7 , 3 , 6 , 9 and 1 is ....
(8 *or* 1 *or* 7 *or* 0)

(8) $\frac{1}{2}$ kg. : 700 gm. = ... : .... (2 : 7 *or* 7 : 8 *or* 5 : 7 *or* 7 : 9)

(9) If the drawing length of an object is 2 cm. and the real length is 20 m. , then the drawing scale is = ...
(1 : 10 *or* 1 : 100 *or* 1 : 1 000 *or* 1 : 10 000)

(10) If the volume of a cube = 0.125 cm^3 , then its edge length = ... cm.
(25 *or* 0.25 *or* 0.5 *or* 5)

(11) Ahmed drinks 21 glasses of milk weekly , then he drinks .... glasses of milk everyday. (3 *or* 9 *or* 6 *or* 12)

(12) From the quantitative data is ....
(favorite colour *or* name *or* age *or* blood type)

(13) The ratio between the perimeter of an equilateral triangle and its side length = ... (1 : 3 *or* 2 : 3 *or* 3 : 1 *or* 3 : 2)

(14) $\frac{1}{4}$: $\frac{1}{3}$ = ... (1 : 4 *or* 1 : 3 *or* 3 : 4 *or* 4 : 3)



2 Complete each of the following :

(1) If the lower limit of the set = 10 and the upper limit = 30 , then the centre = ...

(2) If A : B = 1 : 2 and B : C = 3 : 5 , then A : C = ... : ....

(3) If the drawing length < 1 , this express ....

(4) 3 weeks : 24 days = ... : .... (in the simplest form)

(5) 1 – (37 % + 41 %) = ...

(6) The ratio between two numbers is 7 : 12 , if their sum is 76 , then the greater number = ...

(7) A cuboid is of dimensions 8 cm. , 6 cm. and 10 cm. , then its volume is .... cm^3.

(8) If the perimeter of one face of a cube is 24 cm. , then its volume is .... cm^3.

3 Answer the following questions :

(1) Khaled bought a flat for L.E. 150 000 After selling it , he found that the percentage of his loss was 5 % Calculate the selling price of the flat.

....

....

....

....

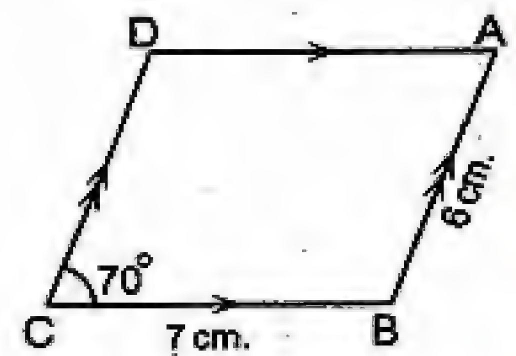
(2) A cube , the perimeter of its base is 40 cm. Calculate its volume.

....

....

(3) **In the opposite figure :**

ABCD is a parallelogram ,
in which m (∠ BCD) = 70° ,
AB = 6 cm. and BC = 7 cm.
Find : **[a]** m (∠ D)
[b] The length of each of $\overline{CD}$ and $\overline{AD}$

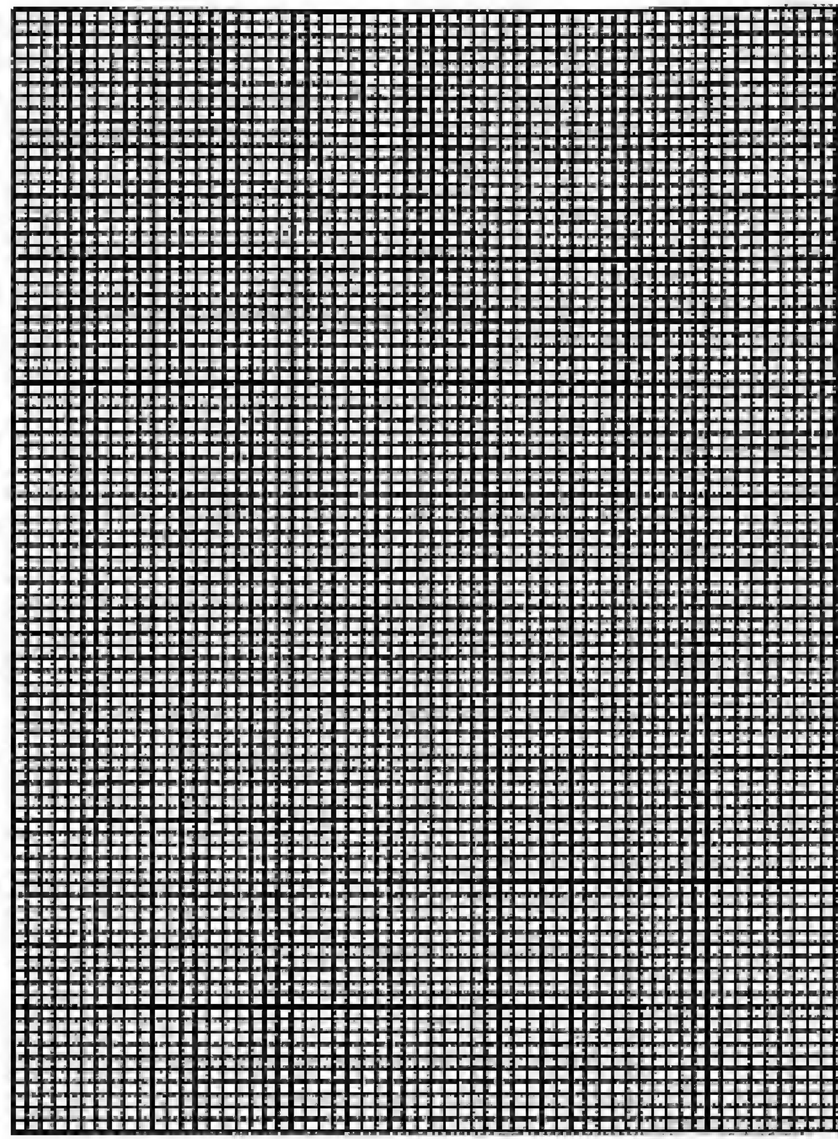


....

(4) **The following table shows the number of hours , which are spent by 60 pupils :**

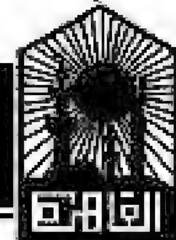
Number of hours	10 –	20 –	30 –	40 –	50 –	Total
Number of pupils	9	13	18	12	8	60

Represent this distribution by a frequency curve.



2 Cairo Governorate

Maadi Educational Zone
Victory College Maadi



Answer the following questions :

1 Choose the correct answer :

(1) If A : B = 2 : 3 and B : C = 3 : 5 , then A : C = ... : ....
(3 : 2 or 5 : 2 or 4 : 5 or 2 : 5)

(2) The following data are descriptive data except ....
(favorite colour or age or name or birth place)

(3) 8 000 gm. : 5 kg. = ... : .... (4 : 5 or 5 : 8 or 2 : 3 or 8 : 5)

(4) If one angle of a parallelogram is right , then its called ....
(rectangle or rhombus or square or cube)

(5) The cuboid has .... faces. (6 or 4 or 12 or 8)

(6) 1.75 = ... % (75 or 0.175 or 175 or 17.5)

2 Complete :

(1) If the drawing scale > 1 , this expresses ....

(2) Mona deposit L.E. 9 000 in a bank with interest 11 % per year , the amount of sum after one year = L.E. ....

(3) If Hazem studies 21 hours weekly , then the rate = ... hours/day

(4) The ratio between two numbers = $\frac{\cdots\cdots}{\cdots\cdots}$

3 **Choose the correct answer :**

(1) 5.6 dm^3 = ... litres. (5600 *or* 560 *or* 5.6 *or* 56)

(2) The ratio between the side length of an equilateral triangle and its perimeter is .... (1 : 3 *or* 1 : 4 *or* 1 : 1 *or* 3 : 1)

(3) The .... is a ratio with second term is 100 (proportion *or* percentage *or* rate *or* drawing scale)

(4) The ratio between a child's age to his father's age is 2 : 9 , if the child's age is 8 years , then his father's age is .... years. (63 *or* 13 *or* 36 *or* 18)

(5) If $\frac{2}{3} = \frac{12}{x}$, then $x + 2$ = ... (16 *or* 20 *or* 18 *or* 36)

(6) A primary school has 540 pupils , if the ratio between the number of boys and the number of girls is 4 : 5 , then the number of boys is .... (300 *or* 240 *or* 352 *or* 675)

4 **Complete each of the following :**

(1) If the length of an insect in the picture is 10 cm. and its real length is 2 mm. , then the drawing scale = ... : ....

(2) In the parallelogram , the sum of the measures of any two consecutive angles is ....°

(3) The range of the 7 , 3 , 6 , 9 and 5 is ....

(4) The sum of lengths of all edges of a cube is 132 cm. , then its volume is .... cm^3

5 **Answer the following :**

(1) Three persons participated in a commerce , the first paid L.E. 1 500 , the second paid L.E. 2 000 and the third paid L.E. 2 500 , at the end of the year the loss is L.E. 1 200
Find the share of each of them from loss.

....

....

....

....

....



(2) 10 litres of water were poured in a vessal in the shape of a cuboid , its base is square of side length is 25 cm.
Find the height of the water in the vessel.

....

....

(3) The perimeter of a rectangle is 140 cm. and the ratio between its dimensions is 3 : 4 Find its area.

....

....

....

(4) Which is greater in volume , a cuboid whose dimensions are 12 cm. , 10 cm. and 8 cm. or a cube of edge length 10 cm. ?

....

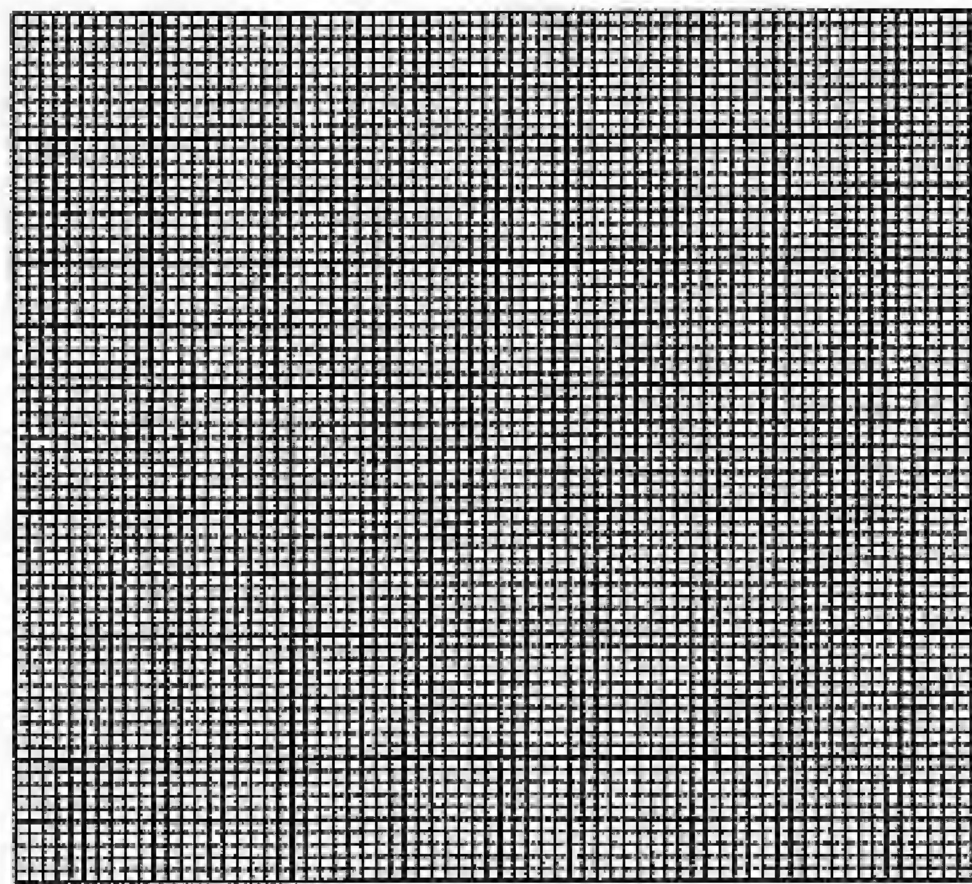
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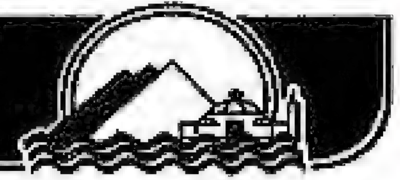
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(5) The following table shows the number of hours which spent by 40 pupils to study their lessons daily :

Number of hours	1 –	2 –	3 –	4 –	5 – 6	Total
Number of pupils	6	3	8	12	11	40

Represent these data using the frequency curve.





3 Giza Governorate

Omrania Educational Zone
El-Shahid (M.M.A) Exp. Lang. Sch.

Answer the following questions :

1 Choose the correct answer :

(1) The volume of a cube equals 125 cm^3, then the area of its base = ...
(5 cm^2 or 25 cm^2 or 125 cm^2 or 100 cm^2)

(2) $\frac{2}{5}$ = ... % (20 or 30 or 40 or 50)

(3) If a : b = 3 : 5 and b : c = 5 : 7 , then a : c = ...
(2 : 3 or 3 : 4 or 3 : 7 or 8 : 7)

(4) 1 – 25 % = ... ($\frac{3}{4}$ or $\frac{1}{4}$ or $\frac{1}{8}$ or $\frac{3}{8}$)

(5) If the numbers 3 , 5 , x and 20 are proportional , then x + 3 = ...
(6 or 12 or 15 or 21)

(6) If the drawing length is 6 cm. , and the real length is 6 metres , then the drawing scale = ... (1 : 10 or 1 : 100 or 1 : 1000 or 1 : 1)

2 Choose the correct answer :

(1) $\frac{3}{4}$ litre = ... mL. (0.75 or 7.5 or 750 or 75)

(2) The two diagonals are perpendicular in ....
(rectangle or rhombus or triangle or parallelogram)

(3) The range of the values 7 , 3 , 6 , 9 and 1 is ....
(8 or 1 or 7 or 0)

(4) The ratio between Aya's age and Eman's age is 1 : 6 , if Aya's age is 6 years old , then Eman's age is .... years old. (32 or 36 or 39 or 42)

(5) If 45% of x = 90 , then x = ... (20 or 100 or 200 or 300)

(6) The ratio between 15 hours and one day in the simplest form = ...
(1 : 15 or 15 : 1 or 8 : 5 or 5 : 8)

3 Complete :

(1) The number of axes of symmetry of a parallelogram is ....

(2) The two diagonals are equal in length and perpendicular in ....

(3) The difference between the maximum value and the minimum value is called ....

(4) 12 : 18 : 36 = ... : .... : .... (in the simplest form).

(5) A rate is ....

(6) 30 months : 3 years = ... : .... (in the simplest form).

(7) If 2 , x , 8 and 20 are proportional , then x = ...

(8) The drawing scale = $\frac{\dots\dots\dots}{\dots\dots\dots}$

4 **Answer the following :**

(1) Find the cost price of goods sold for 21 275 pounds with profit percentage 15 %

....

....

....

(2) A photo was taken for an insect by enlargement ratio 100 : 1 , if the real length is 0.8 cm. Find the length in the picture.

....

....

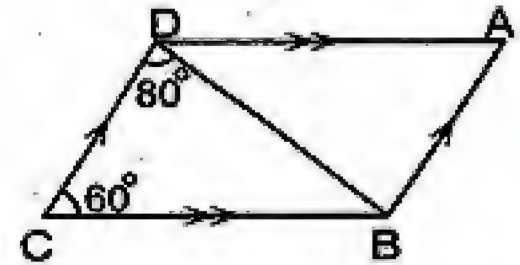
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(3) **In the opposite figure :**

ABCD is a parallelogram.

Find : **[a]** m (∠ ADB)

[b] m (∠ A)



....

....

(4) Which is greater in volume, a cube of edge length 5 cm. or a cuboid of dimensions 3 cm. , 5 cm. and 7 cm. ?

....

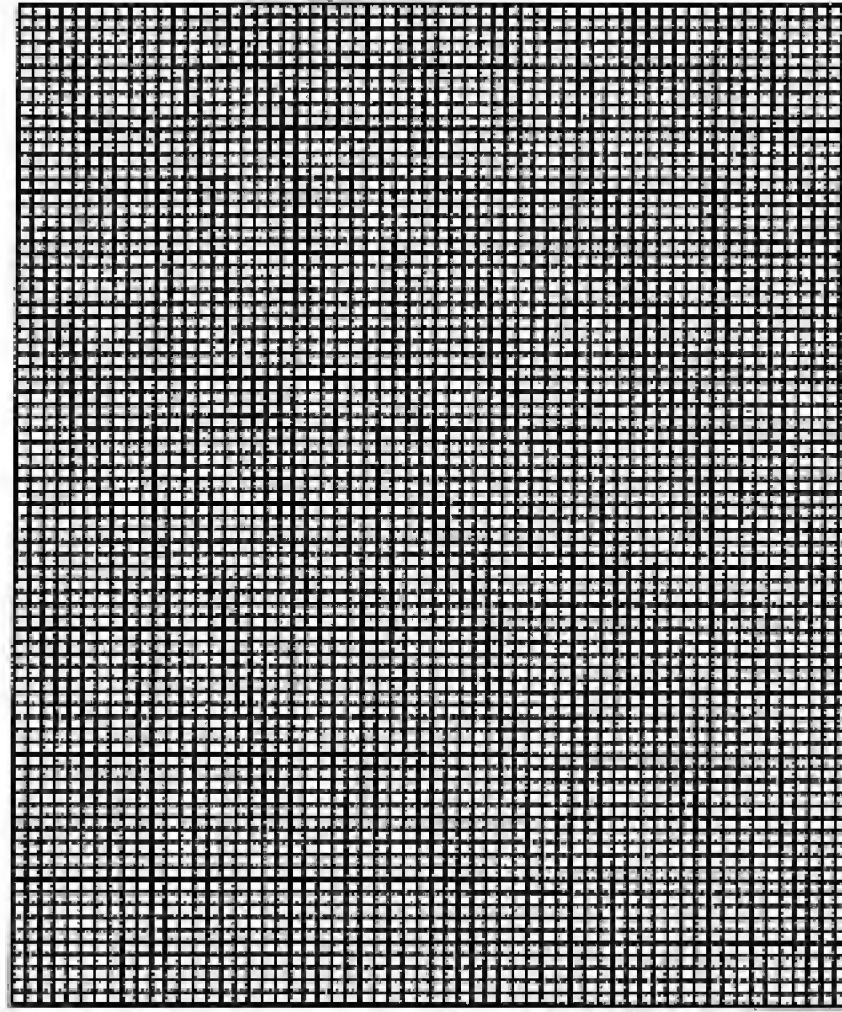
....

....

(5) **The following table shows the marks of 100 students in a maths test :**

Marks	10 –	20 –	30 –	40 – 50	Total
Number of students	15	30	40	15	100

Draw the frequency curve of this distribution.



4 Alexandria Governorate

West Educational Zone
Maths Supervision



Answer the following questions :

1 Choose the correct answer :

(1) $\frac{1}{2}$ kg. .... 700 gm. (< or > or = or ≥)

(2) $\frac{3}{4} : \frac{5}{6} = 9 :$ .... (6 or 10 or 11 or 12)

(3) $\frac{7}{20} =$ .... (7 % or 20 % or 35 % or 42 %)

(4) The parallelogram is a quadrilateral in which the sum of the measures of any two consecutive angles equals ....
(90° or 100° or 120° or 180°)

(5) 4 m^3 = ... dm^3 (40 or 400 or 4 000 or 40 000)

(6) If the numbers 4 , x , 12 , 18 are proportional , then x = ...
(6 or 8 or 10 or 12)

(7) 8 hours : 3 days = 1 : .... (3 or 6 or 9 or 12)

(8) If $\frac{5}{8} = \frac{15}{x}$, then x = ... (8 or 16 or 24 or 32)

(9) If the distance between two cities on a map is 3 cm. , and the real distance between them is 9 km. , then the drawing scale of the map = 1 : ....
(3 or 3 000 or 30 000 or 300 000)

(10) If the number of boys in a class is 35 % from the total number of pupils , then the percentage of girls is .... (35 % or 65 % or 50 % or 55 %)



(11) The cuboid has six faces each of them is ....

(a rectangle *or* a square *or* a rhombus *or* a cube)

(12) If the marks of 6 students in one exam is 29 , 33 , 57 , 40 , 36 , 49 , then the range of these marks = ... (32 *or* 33 *or* 28 *or* 86)

2 Complete each of the following :

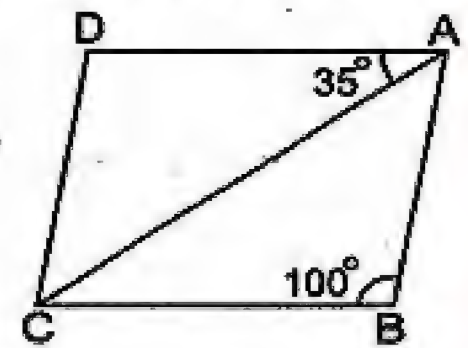
(1) The volume of a cube of edge length 4 cm. = ... cm^3.

(2) As comparing between two similar quantities or numbers and of the same unit , then the resultant fraction is called ....

(3) The ratio between the circumference of the circle and its diameter length = ... : ....

(4) If the real length of an insect is 0.3 mm. and its length in a picture is 4.5 cm. , then the drawing scale = ... : ....

(5) **In the opposite figure :**



ABCD is a parallelogram

, then m (∠ ACD) = ... °

(6) If A : B = 2 : 3 , B : C = 3 : 5 , then A : C = ... : ....

(7) $\frac{\text{The drawing length}}{\text{The real length}}$ = ...

(8) The maximum mark – The minimum mark = ...

3 Answer the following :

(1) If the ratio between the weight of Hani and the weight of Ahmed is 5 : 6 , if the weight of Ahmed is 60 kilograms.
Calculate the weight of Hani.

....

....

....

....

(2) If Hazem studies 21 hours weekly , then find the rate of his studying daily.

....

(3) A cuboid of volume is 2 128 cm^3, its height is 14 cm. Find the area of its base.

....

(4) A swimming pool in the shape of a cuboid , whose internal dimensions are 40 m. , 30 m. and 1.8 m. Find its capacity in litres.

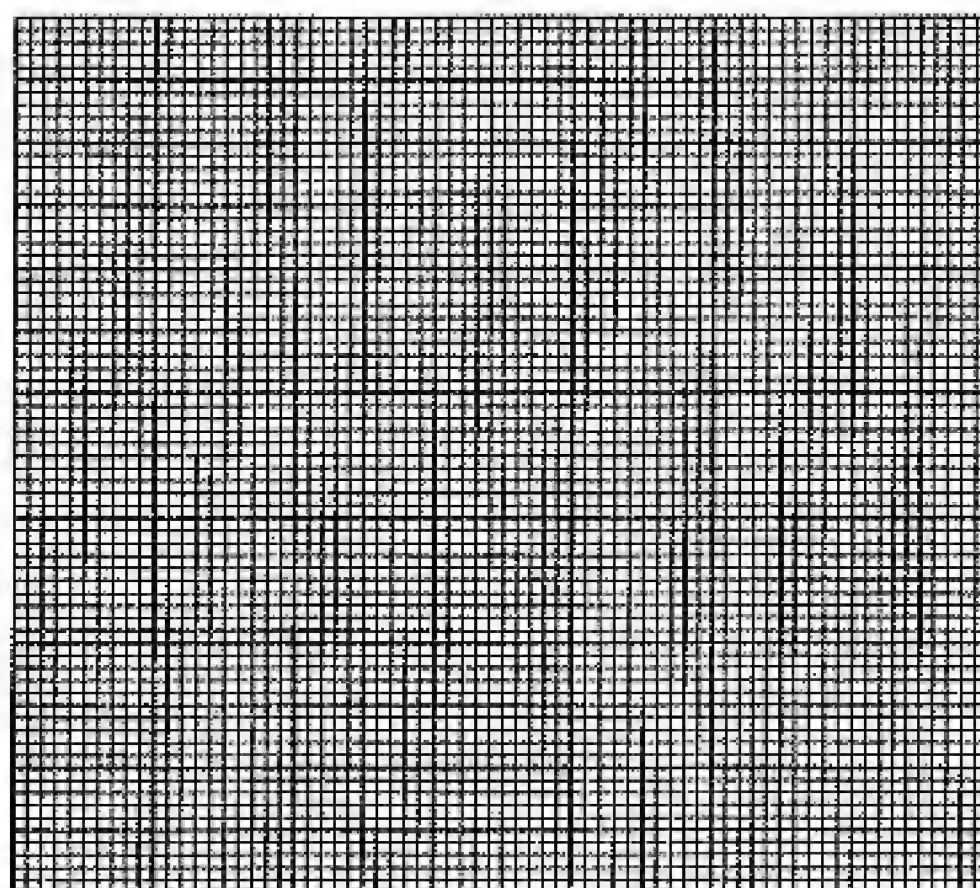
....

....

(5) The following table shows the number of hours which spent by 40 pupils to study their lessons daily :

Number of hours	1 –	2 –	3 –	4 –	5 – 6	Total
Number of pupils	6	3	8	12	11	40

Represent these data using the frequency curve.



5 El-Kalyoubia Governorate

Banha Educational Zone
Maths Supervision



Answer the following questions :

1 Choose the correct answer :

(1) If A : B = 2 : 3 , B : C = 3 : 5 , then A : C = ...

(3 : 5 or 2 : 5 or 5 : 3 or 5 : 2)

(2) If $\frac{4}{6} = \frac{12}{x}$, then $x + 2 =$ .... (16 or 18 or 20 or 22)

(3) $\frac{3}{4}$ = ... (in a decimal form) (0.2 or 0.25 or 0.5 or 0.75)

(4) A car consumes 20 litres of petrol to cover a distance 250 km. , then the rate of consumption of the car is ....

(0.08 L./km. or 0.8 L./km. or 8 L./km. or 80 L./km.)

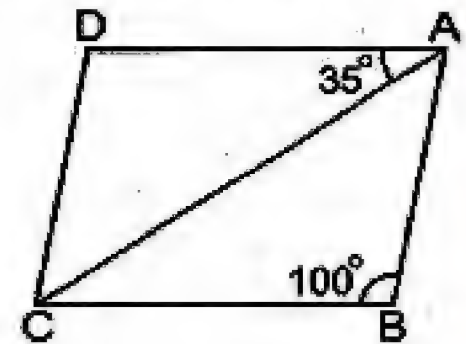
(5) If the real length of an insect is 0.3 mm. and its length in a picture 4.5 cm. , then the drawing scale = ...

(1 : 15 *or* 1 : 150 *or* 150 : 1 *or* 15 : 1)

(6) $\frac{3}{10}$ = ... (300 % *or* 40 % *or* 30 % *or* 0.3 %)

(7) If the volume of a cuboid is 64 cm^3 and the area of its base 16 cm^2 , then its height = ... (4 m. *or* 0.4 cm. *or* 4 dm. *or* 4 cm.)

(8) In the opposite figure :
ABCD is parallelogram
, then m (∠ ACD) = ...



(35° *or* 55° *or* 45° *or* 60°)

(9) A cube , the sum of lengths of all edges is 132 cm.
, then its volume = ...

(1 771 cm^3 *or* 1 331 cm^3 *or* 1 444 cm^3 *or* 299 968 cm^3)

(10) In your class , if the percentage of boys is 35 % from the total number of pupils , then the percentage of the girls in this class = ...

(65 % *or* 55 % *or* 75 % *or* 35 %)

(11) The following data are descriptive data except ....

(favorite color *or* age *or* birth place *or* blood species)

(12) If the numbers 9 , 21 , 3 , x are proportional , then x = ...

(9 *or* 8 *or* 7 *or* 6)

2 Complete the following :

(1) ABC is an equilateral triangle where AB = 5 cm. , then the ratio between AB and the perimeter of triangle ABC = ... : ....

(2) The range of the set of values 50 , 25 , 35 , 20 is ....

(3) An agricultural tractor ploughs 28 feddans in 4 hours , the time which need to plough 42 feddans is .... hours.

(4) The ratio between child's age and his father is 1 : 10 and the age of child is 6 years , then the father's age = ... years.

(5) Hasnaa drew a picture for Omar with drawing scale 1 : 40 , if the real height of Omar is 160 cm. , then the height of Omar in the picture = ... cm.

(6) If one angle in a parallelogram is right , then it is called ....

(7) 2.65 litres = ... dm^3 = ... cm^3

(8) 16 kirats : 1 feddan = ... : .... (in the simplest form)

3 **Answer the following :**

(1) Two persons started a commercial business , the first paid L.E. 5 000 and the second paid L.E. 8 000 At the end of the year , the profit was L.E. 3 900 Calculate the share of each of them from the profit.

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(2) A building worker used 1 500 bricks to build a wall , calculate the volume of the wall in m^3 if the brick is in the shape of a cuboid of dimension 25 cm. , 12 cm. , 6 cm.

....

....

....

(3) An auto fair owner bought a car for L.E. 45 000 , then he spent L.E. 5 000 for repairing it , then he sold it for L.E. 55 000 Calculate :

[a] The profit after selling.

[b] The percentage of profit.

....

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(4) 10 litres of water were poured in a vessel in the shape of a cuboid its base is a square of side length is 25 cm. Find the height of water in the vessel.

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(5) The following table shows the number of hours which spent by 40 pupils to study their lessons :

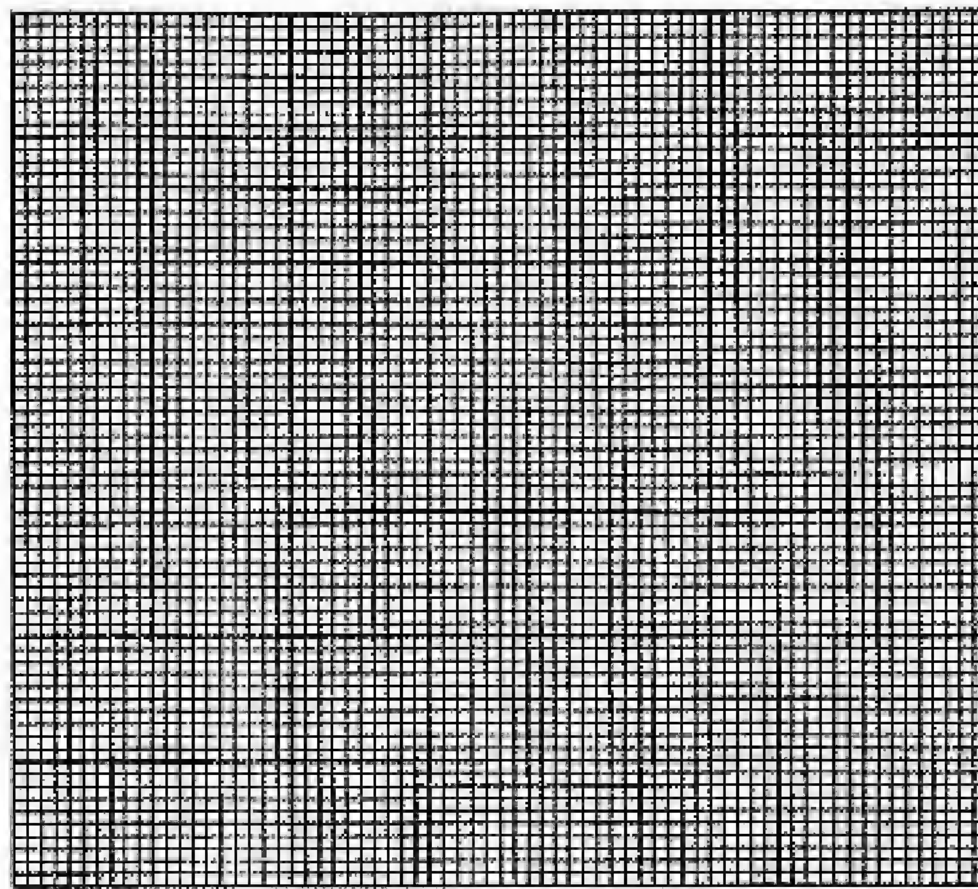
Number of hours	1 –	2 –	3 –	4 –	5 – 6	Total
Number of pupils	6	X	8	12	11	40

[a] Find the value of X

....



[b] Represent these data using the frequency curve.



6 El-Sharkia Governorate

Belbeis Educational Administration
Al-Resala Language Schools

Answer the following questions :

1 Choose the correct answer :



(1) The fraction that represents the shaded part = ...

($\frac{1}{4}$ *or* $\frac{3}{4}$ *or* $\frac{2}{6}$ *or* $\frac{4}{7}$)

(2) 0.23 m^3 = ... L (0.23 *or* 230 *or* 2.3 *or* 0.023)

(3) If $\frac{4}{6} = \frac{8}{x}$, then $x + 2$ = ... (15 *or* 14 *or* 16 *or* 12)

(4) The ratio between 15 hours , one day = ...

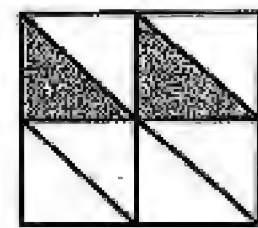
(1 : 15 *or* 15 : 1 *or* 8 : 5 *or* 5 : 8)

(5) If the range of some values is 40 and the number of sets is 10 , then the length of set = ... (5 *or* 7 *or* 6 *or* 4)

(6) All of the following data are quantitative except ....

(tallness *or* age *or* name *or* phone number)

(7) The number of angles in the following shape = ...



(1 *or* 2 *or* 3 *or* 4)



(8) The range of the values 29 , 33 , 57 , 40 , 36 is ....

(27 *or* 28 *or* 29 *or* 24)

(9) If 10 A , 2 , 2 A , B are proportional , then B = ...
(0.2 or 0.4 or 0.5 or 0.3)

(10) If x , 16 , 6 , 8 are proportional , then x = ...
(1 or 6 or 8 or 12)

(11) 6.5 L. = ... dm^3 (56 or 6.5 or 5 600 or 56 000)

(12) If a car covered 180 km. in three hours , then the velocity of this car = ... km./hr. (80 or 60 or 50 or 20)

2 **Complete the following :**

(13) $\frac{5}{4}$: 2 = ... : .... (in the simplest form)

(14) If the lower limit of the set = 10 and the upper limit = 30 , then its centre = ...

(15) The ratio between the width and the length of a rectangle is 3 : 4 , then length : perimeter = ...

(16) An amount of money is divided between two persons in the ratio 5 : 6 , then what the first took = ... the total.

(17) 1 – (24 % + 35 %) = ... %

(18) If the drawing scale < 1 , its represents ....

(19) Discover the pattern and write the description of ⬠ ◯ ⬠ ◯ is ....

(20) The range of values (6 , 2 , 7 , x) is 9 , then x = ...

3 **Answer the following questions :**

(21) In a school , if the number of students is 560 students , if the number of girls $\frac{3}{5}$ of boys , find the number of each of boys and girls.

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(22) Ahmed drew a picture of his brother Osama by drawing scale 1 : 40 , if the real length is 160 cm. Find the drawing length.

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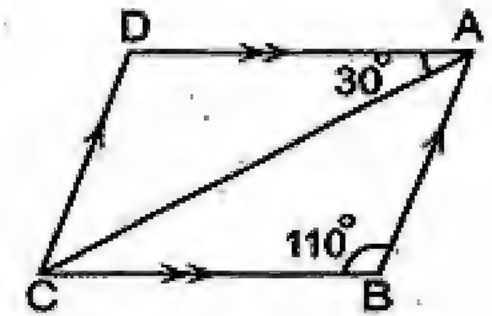
(23) A cube of cheese , its edge length is 15 cm. , it is wanted to be divided it into small cubes , the edge length of each is 3 cm. for presenting them through meals. Calculate the number of the resulting small cubes.

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(24) The opposite figure shows a parallelogram in which m (∠ B) = 110° and m (∠ DAC) = 30°
Find : m (∠ D) , m (∠ BAC) and m (∠ ACD)



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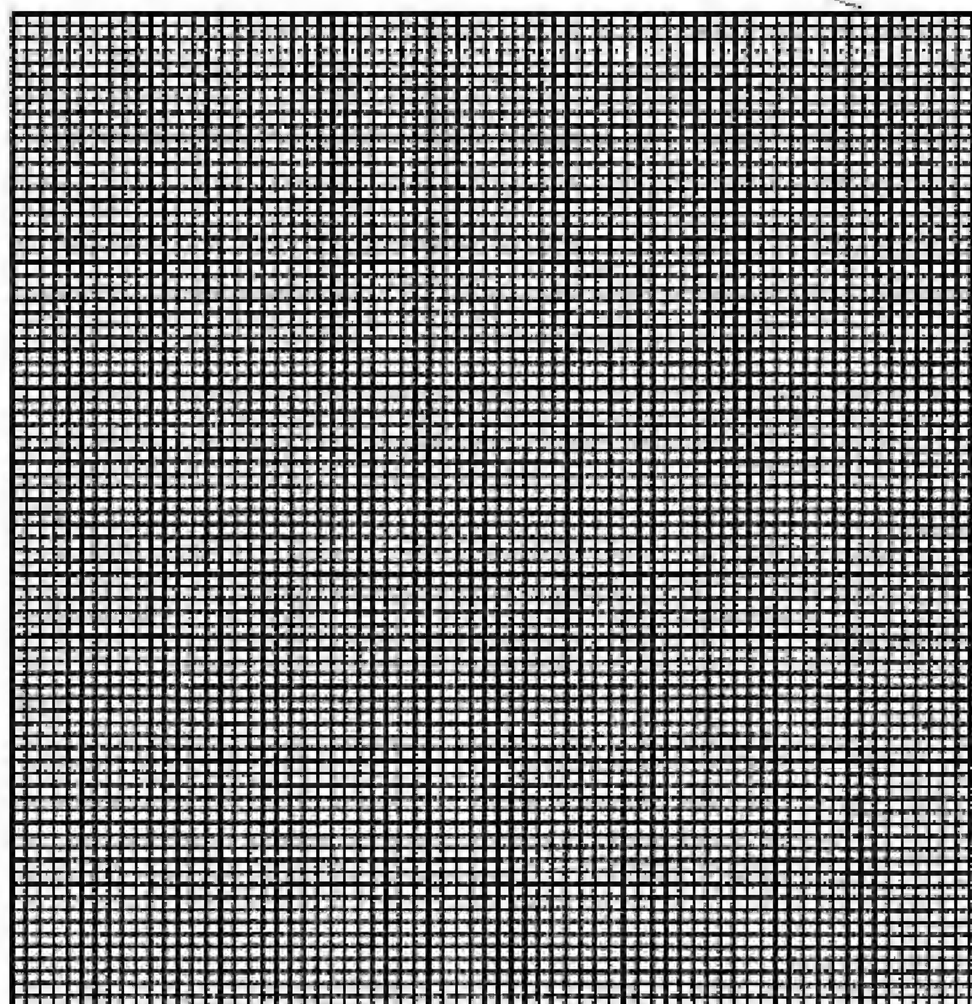
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(25) The following table shows a sample of patients who suffer from a certain disease in a hospital due to the hours which were spent till they became healthy :

Number of hours	1 –	2 –	3 –	4 –	5 –	6 –	Total
Number of patients	7	11	15	6	4	2	45

Represent these data by a frequency curve.



7 El-Monofia Governorate

Shiben El-Kom Educational Directorate
Maths Department



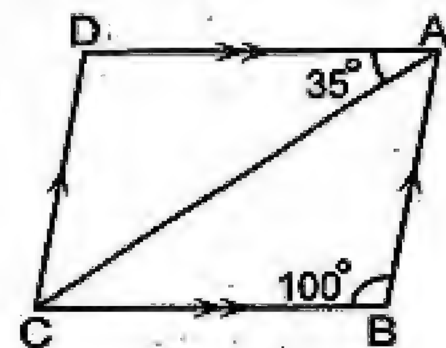
Answer the following questions :

1 Choose the correct answer :

(1) The following data are descriptive data except ....

(favorite color *or* age *or* birth place *or* blood species)

(2) In the opposite figure :



ABCD is parallelogram

, then m (∠ ADC) = ...

(35° *or* 45° *or* 100° *or* 135°)

(3) If the numbers 3 , 5 , x and 20 are proportional , then x = ...

(6 *or* 12 *or* 15 *or* 21)

(4) If one of angles of the parallelogram is right , then the resulting figure is a .... (rectangle *or* square *or* rhombus *or* cube)

(5) If an agriculture tractor ploughs 28 feddans in 4 hours , then the time needed to plough 42 feddans is .... hours. (4 *or* 6 *or* 7 *or* 8)

(6) $\frac{5}{4} : 3\frac{1}{4}$ = ... (5 : 13 *or* 1 : 3 *or* 3 : 1 *or* 5 : 9)

(7) The sum of edge lengths of a cube is 24 cm. , then its volume = ... cm^3

(2 *or* 8 *or* 12 *or* 24)

(8) 25 % of 1 000 = ... (2 000 *or* 1 500 *or* 250 *or* 500)

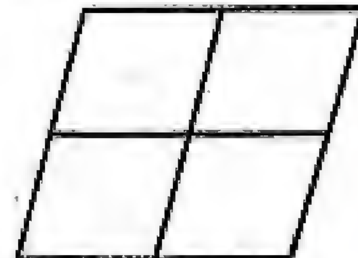
(9) The ratio between 250 grams and $\frac{1}{2}$ kg. = ...

(2 : 1 *or* 2 : 3 *or* 1 : 2 *or* 3 : 2)

(10) A machine produces 600 metres of clothes regularity in one hour and half , then the rate of production in metre per hour = ... metre/hour

(500 *or* 400 *or* 300 *or* 200)

(11) In the opposite figure :



The number of parallelograms which can be obtained is ....

(4 *or* 5 *or* 7 *or* 9)

(12) The following in this pattern △ ○ ○ □ △ ○ ○ is ....

(△ *or* ○ *or* □ *or* ◇)

2 **Complete :**

(1) $\frac{1}{4}$ = ... %

(2) If the dimensions of cuboid are equal in length , then it is called a ....

(3) The range of the set of the values 7 , 3 , 15 and 8 is ....

(4) The ratio between the side length of the square and its perimeter = ... : ....

(5) If $\frac{4}{6} = \frac{12}{x}$, then $x - 2$ = ...

(6) 1 500 dm^3 = ... litres

(7) If the real length of an insect is 0.5 millimetres and its length in the picture is 4.5 cm. , then its drawing scale = ... : ....

(8) If A : B = 2 : 3 , B : C = 3 : 5 , then A : C = ... : ....

3 **Answer the following :**

(1) Heba bought a vacuum cleaner for 220 pounds with a discount 20 %
Calculate the price before discount.

....

....

....

....

(2) If the ratio between Hadir's weight and Basma's weight is 5 : 6 and the difference between their weights is 10 kg. Calculate the weight of each of them.

....

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(3) In a metallic cube whose edge length is 12 cm. we want to melt and convert it to a number of cuboid alloys of dimensions 3 cm. , 4 cm. and 6 cm.
Calculate the number of alloys which can be obtained.

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(4) A container has 12 litres of oil. We need to distribute it on small bottles with each one of the capacity 400 cm^2. Calculate the number of the needed bottles.

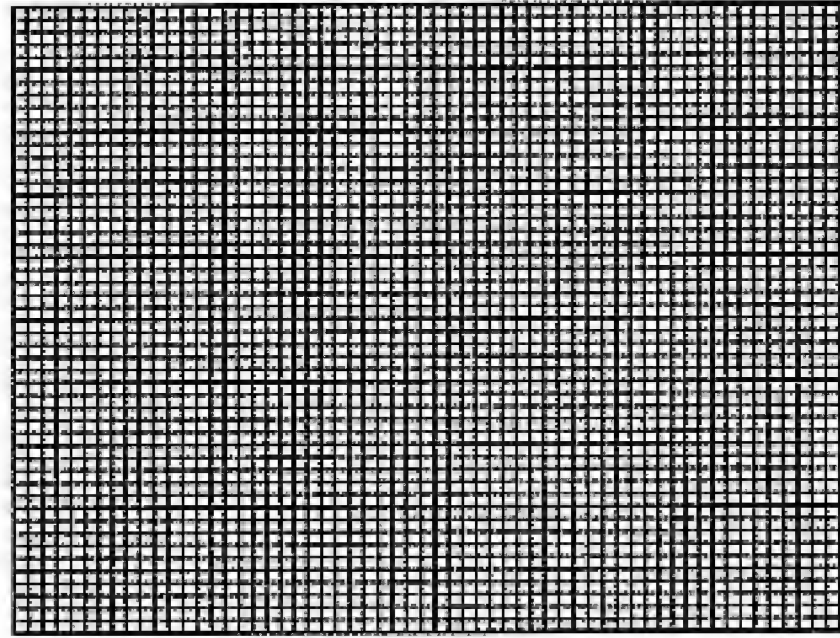
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(5) The following table shows the marks of 100 pupils in mathematics :

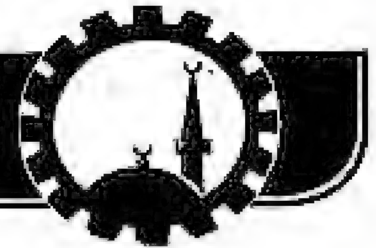
Marks	10 –	20 –	30 –	40 – 50	Total
No. of pupils	15	40	30	15	100

Draw the frequency curve for this distribution.



8 El-Gharbia Governorate

El-Gharbia Educational Directorate
Maths Supervision



Answer the following questions :

1 Choose the correct answer :

(1) If $\frac{4}{6} = \frac{12}{x}$, then $x + 2 =$ .... (16 or 18 or 20 or 22)

(2) The following data are descriptive data except ....
(favorite color or age or birth place or blood species)

(3) The volume of a cube is 27 cm^3 , then the perimeter of its base equals .... cm.
(36 or 24 or 27 or 12)

(4) The ratio between the circumference of the circle and its diameter length = ... : .... ($\pi : 1$ or $2\pi : 1$ or $1 : 4$ or $\pi : d$)

(5) If the volume of a cuboid = 300 cm^3 , its base area = 25 cm^2 , then its height = ... cm. (12 or 13 or 14 or 15)

(6) If the range is 40 and the length of the set is 5 , then the number of sets = ... (5 or 6 or 7 or 8)

(7) If one angle of the parallelogram is right and its sides are equal in length , then it is called .... (square or rhombus or triangle or rectangle)

(8) 1 – (35 % + 25 %) = ... ($\frac{1}{2}$ or $\frac{1}{3}$ or $\frac{2}{5}$ or $\frac{3}{4}$)

(9) The diagonals are perpendicular and have the same length in the ....

(square **or** rectangle **or** trapezium **or** parallelogram)

(10) 1.45 litres + 0.5 dm^3 = ... litres. (1.5 **or** 1.95 **or** 1.55 **or** 6.5)

(11) The percentage is a ratio , which its second term is ....

(10 **or** 100 **or** 1 000 **or** 10 000)

(12) How many bottles of 750 mL. each can be filled with 30 litres of water ?

(4 **or** 40 **or** 400 **or** 4 000)

(13) $\frac{1}{8}$ day : 6 hours : $\frac{1}{2}$ day = ... : .... : ....

(1 : 2 : 6 **or** 1 : 2 : 4 **or** 1 : 2 : 3 **or** 3 : 2 : 1)

(14) 12 % of 500 kg. = ... kg. (40 **or** 50 **or** 60 **or** 70)

2 Complete the following :

(15) If the ratio between measures of the angles of triangle is 5 : 6 : 7 , then the measure of the greatest angle = ... °

(16) 16 kirats : 1 feddan = ... : .... (in the simplest form)

(17) 2.65 litres = ... dm^3

(18) $\frac{7}{20}$ = ... %

(19) If the ratio a : b = 4 : 3 and the ratio b : c = 2 : 3 , then the ratio a : b : c = ... : .... : ....

(20) If the sum of lengths of all edges of a cube is 132 cm. , then its volume = ... cm^3

(21) If the real length of an insect is 0.3 mm. and its length in a picture is 4.5 cm. , then the drawing scale = ... : ....

(22) If Hassan spends L.E. 45 within three days , then the rate of what Hassan spends per day is ....

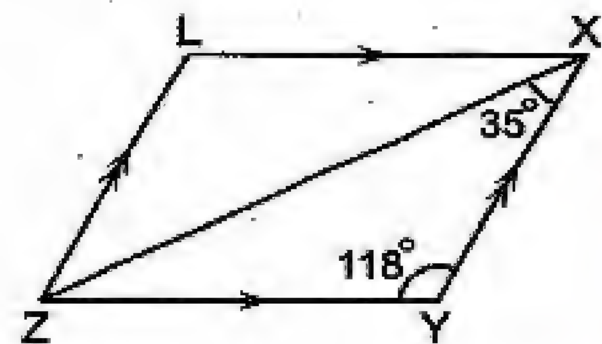
3 Answer the following :

(23) In the opposite figure :

XYZL is a parallelogram in which

m (∠ Y) = 118° , m (∠ YXZ) = 35°

Find : m (∠ L) , m (∠ LXZ)



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(24) A metallic cube of edge length 12 cm. , it needs to be converted into ingots in the shape of cuboid each of them of dimensions 3 cm. , 4 cm. and 6 cm. Calculate the number of ingots that are obtained.

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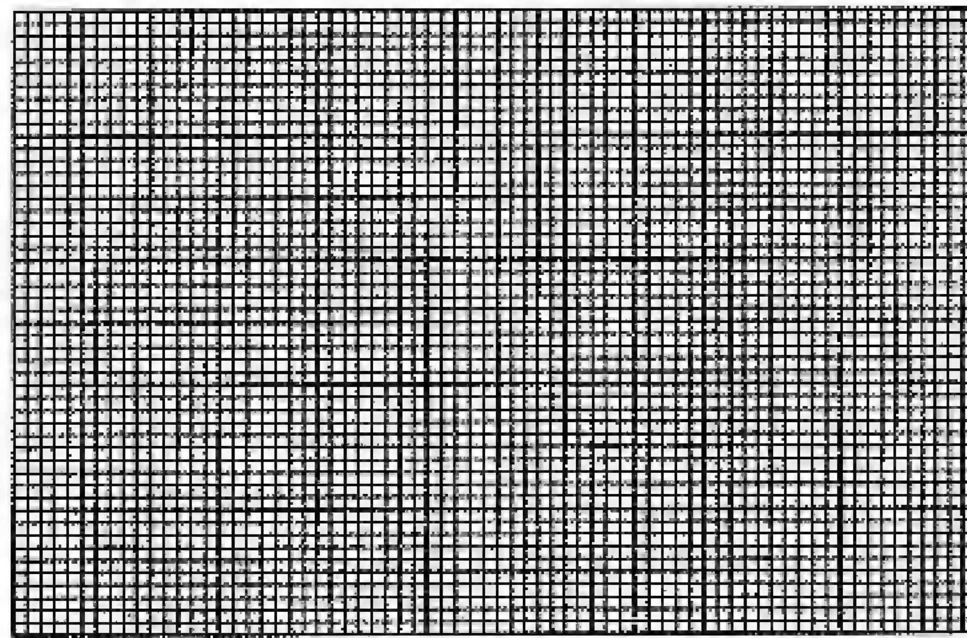
(25) Three persons shared in business. The first paid 15 000 pounds , the second paid 25 000 pounds and the third paid 20 000 pounds. At the end of the year the net profit was 5 520 pounds. Calculate the share of each of them.

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(26) The following table shows the marks of 100 students in one month in maths :

Marks	20 –	30 –	40 –	50 –	Total
Number of students	15	30	40	15	100

Draw the frequency curve for this distribution.



9 El-Dakahlia Governorate
Maths Supervision



Answer the following questions :

1 Choose the correct answer :

(1) The ratio between the length of diameter of circle and its circumference is .... (1 : 1 *or* 1 : 4 *or* 1 : π *or* π : 1)

(2) .... is a ratio between two different quantities.

(Ratio *or* Proportion *or* Rate *or* Drawing scale)

(3) $\frac{x}{5} = 60\%$, then $x + 3 =$ .... (3 or 6 or 600 or 30)

(4) $\frac{1}{2} : \frac{3}{4} : \frac{2}{3} =$ .... (6 : 8 : 9 or 8 : 9 : 6 or 9 : 6 : 8 or 6 : 9 : 8)

(5) If the drawing scale > 1 , then this expresses ....

(magnification or reduction or congruent or otherwise)

(6) If the number of sets is 8 and length of set is 5 , then the range = ...

(3 or 13 or 40 or 6)

(7) 20 % of a number = ... % of half the same number.

(10 or 20 or 30 or 40)

(8) Volume of a cube whose sum of edge lengths of two adjecent faces is 56 cm. is .... cm^3. (512 or 7 or 8 or 343)

(9) Parallelogram with equal diagonals in length is called ....

(trapezium or rectangle or rhombus or square)

(10) If the radius length of a circle increases by the ratio 5 % , then the diameter length increases by ratio .... (5 % or 10 % or 15 % or 5)

(11) All of the following data are descriptive except ....

(address or qualifications or age or birth place)

(12) A car consumes 4 litres of fuel to cover distance 100 km. , then the rate of consumption is .... litre per km. (25 or 0.4 or 0.04 or 400)

2 Complete :

(1) In parallelogram ABCD , m (∠ A) + m (∠ C) = 140° , then m (∠ B) = ...°

(2) The volume of cuboid with dimensions 10 cm. , 8 cm. and 7 cm. = ... cm^3.

(3) Age , birth date and weight are called .... data.

(4) 1.5 litre + 0.35 dm^3 + 150 cm^3 = ... cm^3.

(5) If $A = \frac{1}{2}$ B , then B : A = ... %

(6) [square] [square] [square] .... (in the same pattern)

(7) If the lengh of an insect is 3 mm. , if its length in the picture is 6 cm. , then the ratio of magnification is ....

(8) The area of a triangle = ...

3 Answer the following :

(1) If the number of pupils in a school is 630 pupils , if the ratio between the number of boys and the number of girls is 5 : 4 Find the number of each.

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(2) A map is drawn with scale 1 : 400 000 , if the distance between two cities is 12 km. Find the distance between them on the map.

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(3) A trader bought a TV set by L.E. 4 500 and sold it with profit 10 %
Find the selling price.

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(4) A box in a cuboid shape with square base its side length is 40 cm. and height 30 cm. is filled by bars of soaps in a cuboid shape with dimensions 6 cm. , 4 cm. and 5 cm. Find the greatest number of soaps can be put in the box.

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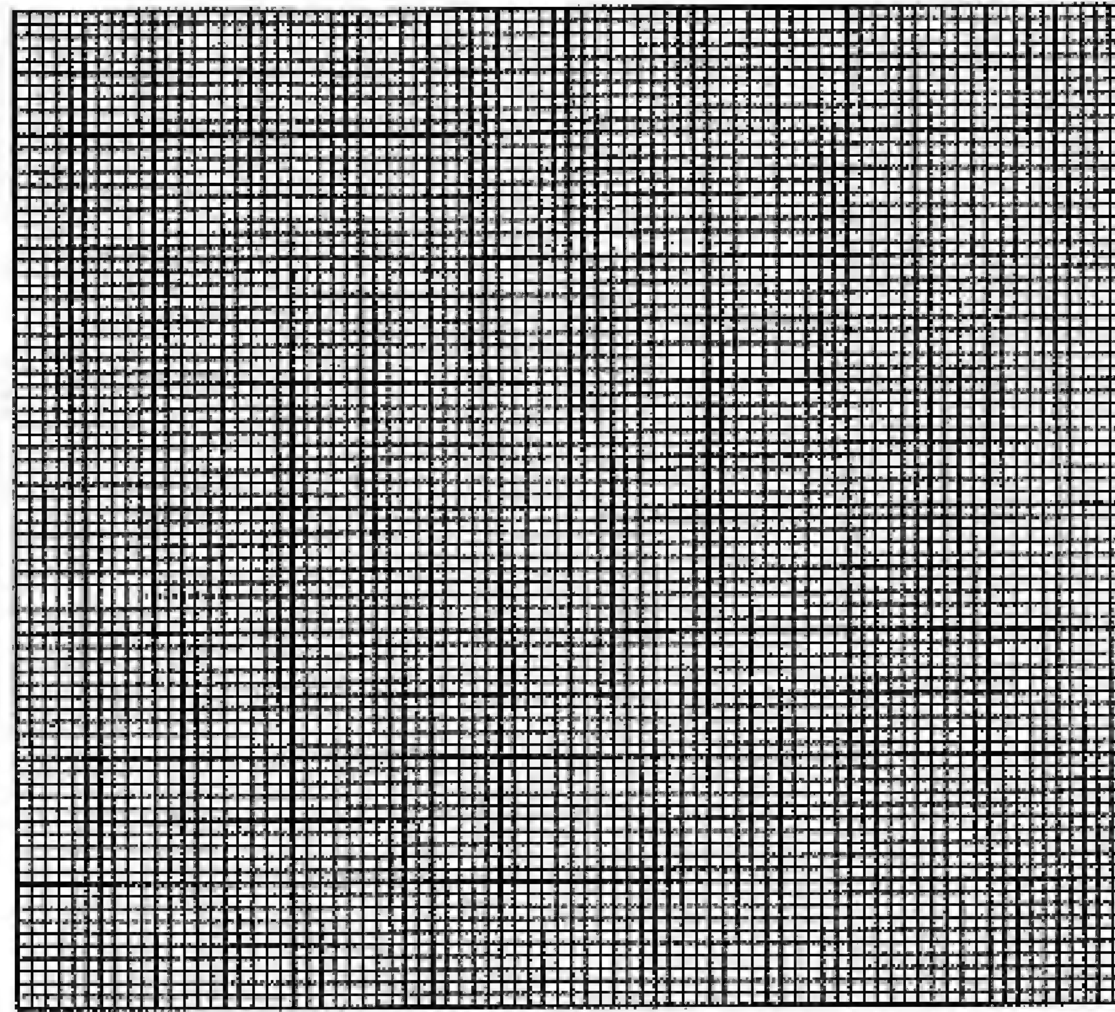
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(5) The following table shows the number of hours which 50 pupils spend to study their lessons daily :

Number of hours	1 –	3 –	5 –	7 –	9 – 11	Total
Number of pupils	6	10	14	12	8	50

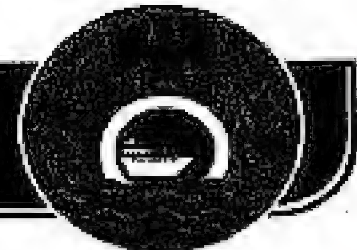
Represent these data by using a frequency curve.





10 Ismailia Governorate

South Ismailia Educational Zone
Suez Canal Language School



Answer the following questions :

1 Choose the correct answer :

(1) If A : B = 2 : 3 , B : C = 3 : 5 , then A : C = ...
(2 : 5 **or** 3 : 6 **or** 2 : 3 **or** 5 : 2)

(2) If $\frac{2}{5} = \frac{x}{15}$, then x = ... (2 **or** 5 **or** 6 **or** 15)

(3) The following data are descriptive data except ....
(favorite colour **or** age **or** birth place **or** blood species)

(4) If the number 2 , 7 , x and 21 are proportional , then x = ...
(6 **or** 21 **or** 12 **or** 7)

(5) If the real length of a tree is 6 m. and its drawing , length is 3 cm. , then the drawing scale = ... : ....
(1 : 100 **or** 1 : 200 **or** 1 : 300 **or** 1 : 600)

(6) 0.3 m^3 = ... dm^3 (3 000 **or** 300 **or** 30 **or** 3)

(7) If the volume of a cuboid equals 315 cm^3 , its base with length 9 cm. and width 7 cm. , then its height = ... cm. (7 **or** 5 **or** 63 **or** 45)

(8) The two diagonals are equal in length and perpendicular in ....
(rectangle **or** rhombus **or** triangle **or** square)



(9) $\frac{4}{5}$ = ... % (50 *or* 60 *or* 70 *or* 80)

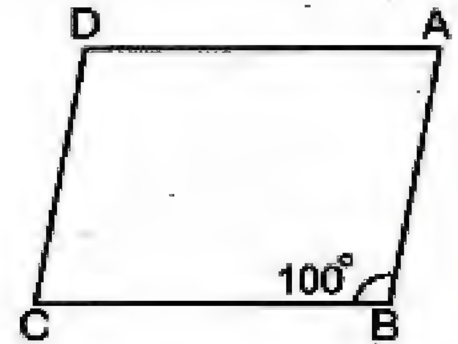
(10) If Hany drinks 21 glasses of milk weekly , then he drinks .... glasses of milk every 3 days. (3 *or* 6 *or* 9 *or* 12)

(11) $\frac{1}{2}$ kg. : 700 gm. = ... (2 : 7 *or* $\frac{7}{8}$ *or* $\frac{5}{7}$ *or* $\frac{7}{9}$)

(12) **In the opposite figure :**

ABCD is a parallelogram , then :

m (∠ D) = ... °



(100 *or* 60 *or* 80 *or* 70)

2 Complete :

(1) The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

(2) If the drawing scale < 1 , then this expresses ....

(3) A cuboid of dimensions 5 cm. , 6 cm. and 2 cm. , its volume is .... cm^3

(4) 1.5 litres + 0.5 dm^3 + 500 cm^3 = ... litres.

(5) 1 – (15 % + 45 %) = ... %

(6) $\frac{1}{4}$: $\frac{1}{3}$: $\frac{1}{2}$ = ... : .... : .... (in the simplest form)

(7) The number of pupils in a primary school is 360 pupils , if the ratio between the number of boys and the number of girls is 1 : 2 , then the number of boys = ...

(8) If the edge length of a cube = 4 cm. , then the volume = ... cm^3

3 Answer the following :

(1) If the buying price of electric sets is L.E. 72 000 and sold at 12 % profit. Calculate the selling price.

....

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(2) Three persons started a business , the first paid 15 000 pounds , the second paid 25 000 pounds and the third paid 20 000 pounds , at the end of the year the profit was 5 520 pounds. Calculate the share of each of them.

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(3) 10 litres of water were poured in a vessel in the shape of a cuboid its base is a square base of side length 25 cm. Find height of the water in the vessel.

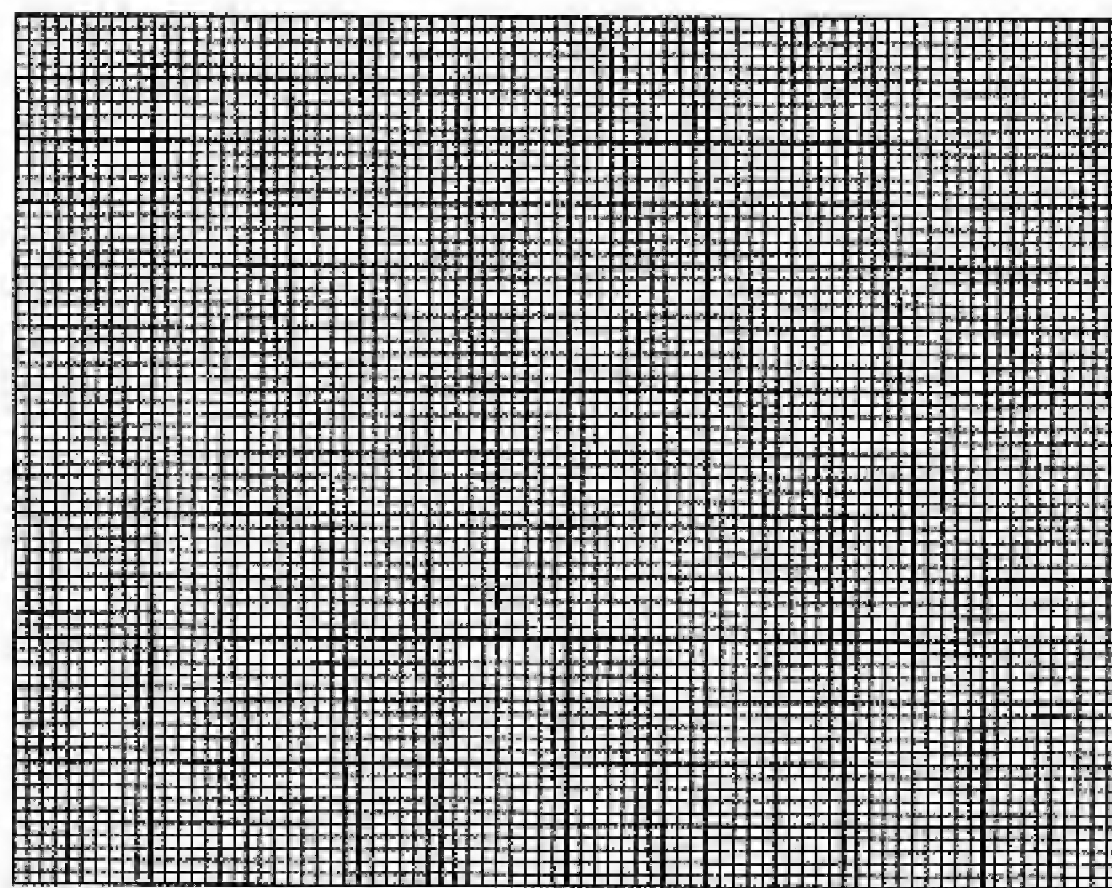
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(4) The following table shows of money in pounds paid by a group of contributors in a charity :

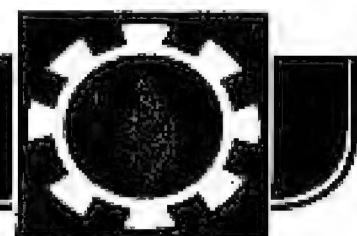
The sum	50 –	60 –	70 –	80 –	90 –	100 –
Number of contributors	5	7	10	12	10	7

Draw the frequency curve of this distribution.



11 Suez Governorate

South Educational Directorate
Maths Inspection



Answer the following questions :

1 Choose the correct answer :

(1) $\frac{2}{5} : \frac{7}{2} =$ .... : .... (5 : 7 or 4 : 35 or 2 : 7 or 5 : 2)

(2) In the parallelogram , the sum of the measures of any two consecutive angles = ...° (45 or 90 or 180 or 360)

(3) The percentage is a ratio its second term is .... (10 or 100 or 200 or 1 000)

(4) 39 days ≃ .... weeks. (4 or 5 or 6 or 7)

(5) The ratio between the length of the side of the equilateral triangle and its perimeter = ... : .... (1 : 3 or 3 : 1 or 4 : 1 or 1 : 4)

(6) Cuboid of dimensions (5 cm. , 2 cm. , 7 cm.) , its volume = ... cm^3 (24 or 48 or 65 or 70)

(7) The following data are descriptive data except .... (favorite colour or birth place or age or blood species)

(8) If $\frac{x}{5} = 40\%$, then $x =$ .... (2 or 4 or 5 or 8)

(9) $3 m^3 =$ .... litres. (300 or 3 000 or 300 000 or 3 000 000)

(10) $\frac{3}{4} =$ .... % (25 or 50 or 57 or 75)

(11) An iron with price L.E. 120 at 20 % discount , the price after discount = L.E. .... (90 or 96 or 100 or 140)

(12) If the length of an insect in the picture is 4 cm. and its real length is 2 mm. , the drawing scale is .... : .... (2 : 1 or 1 : 2 or 20 : 1 or 1 : 20)

2 Complete the following :

(1) Half km. : 250 metres = ... : .... (in the simplest form)

(2) The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

(3) If A : B = 3 : 4 , B : C = 4 : 5 , then A : C = ... : ....

(4) The drawing scale = $\frac{\text{..............}}{\text{The real length}}$



(5) The two diagonals are equal in length in each of ………… , …………

(6) 6 , 8 , 3 , …………… (Complete the missing number to be proportional)

(7) $\frac{1}{2} : \frac{1}{3}$ = ………… : ………… (in the simplest form)

(8) Cuboid of volume is 1 400 cm^3 , its height is 14 cm. , the area of its base = …………… cm^2

3 Answer the following questions :

(1) Hassan spends L.E. 45 within 3 days , what is the rate of what Hassan spends per day ?

……………………………………………………………………………………

(2) A vessel in the shape of a cube with edge length 30 cm. is filled with honey. Calculate the capacity of the vessel.

……………………………………………………………………………………

……………………………………………………………………………………

(3) In one of our schools , there are 560 students , if the number of girls is $\frac{3}{5}$ the number of boys. Find each of the number of boys and girls.

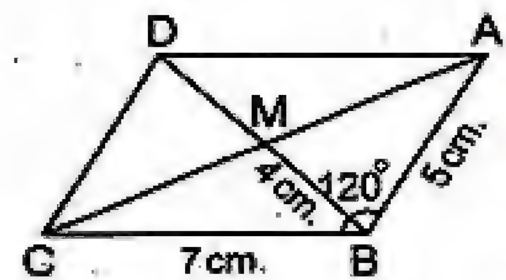
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(4) In the opposite figure :



ABCD is a parallelogram in which

AB = 5 cm. , BC = 7 cm.

BM = 4 cm. , m (∠ ABC) = 120°

Without using geometrical instruments

, find m (∠ ADC) and the perimeter of Δ BCD

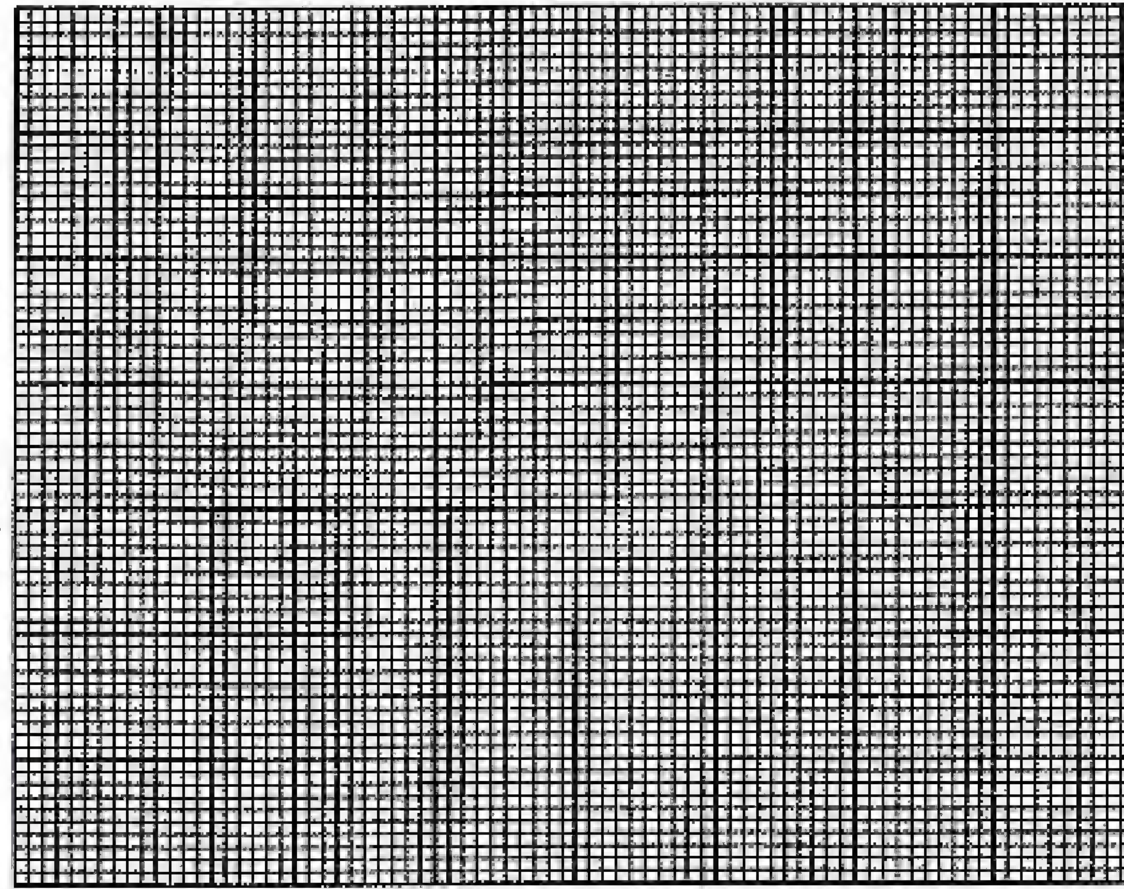
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(5) The following table shows the number of hours which the pupils of a class spend daily in front of the computer :

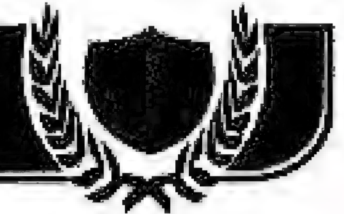
Number of hours	– 1	– 2	– 3	– 4	– 5	– 6	Total
Number of pupils	8	10	12	6	4	2	42

Represent these data by a frequency curve.



12 Port Said Governorate

Maths Inspector



Answer the following questions :

1 Choose the correct answer :

(1) $\frac{2}{3} : 3\frac{1}{3} =$ .... (1 : 2 *or* 1 : 3 *or* 2 : 3 *or* 1 : 5)

(2) The centimetre cube is a unit of measuring the ....
(length *or* area *or* volume *or* weight)

(3) 18 kirats : 2 feddans = ... (1 : 2 *or* 3 : 8 *or* 1 : 24 *or* 18 : 2)

(4) If Heba bought a mobile phone for 900 pounds with a discount 10 % , then the price of the mobile phone before the discount is .... pounds.
(9 000 *or* 1 000 *or* 990 *or* 100)

(5) If the drawing scale < 1 , this expresses ....
(equality *or* maximization *or* enlargement *or* minimization)

(6) A wooden box in the form of a cube , its external volume is 1 000 cm^3 and its capacity is 729 cm^3 , then the volume of wood of the box = ... cm^3
(0.729 *or* 1 729 *or* 271 *or* 729 000)

(7) The diagonals are perpendicular in ....
(rectangle *or* trapezoid *or* rhombus *or* parallelogram)

(8) The ratio between the side length of the square to its perimeter is ....
(1 : 2 *or* 1 : 3 *or* 4 : 1 *or* 1 : 4)



(9) If the ratio among the measurements of the angles of a triangle is 1 : 2 : 3 , then the measurement of the smallest angle is .... °

(10 *or* 20 *or* 30 *or* 60)

(10) $1\frac{3}{4}$ = ... % (25 *or* 50 *or* 75 *or* 175)

(11) If one angle of parallelogram is right , then it is called ....

(rectangle *or* trapezoid *or* rhombus *or* rhombus)

(12) The following data are descriptive data except ....

(age *or* birth place *or* blood species *or* favourite colour)

2 **Complete the following :**

(1) The range of the set of values 8 , 1 , 9 , 11 and 7 is ....

(2) The agricultural tractor ploughs 28 feddans in 4 hours , then the time which needed to plough 42 feddans is .... hours.

(3) If the height of the fence of the villa in the design is 5 cm. and its real height is 5 metres , then the drawing scale is .... : ....

(4) 5 000 grams : 8 kilograms = ... : .... (in the simplest form).

(5) If A : B = 1 : 2 , B : C = 2 : 5 , then A : C = ... : ....

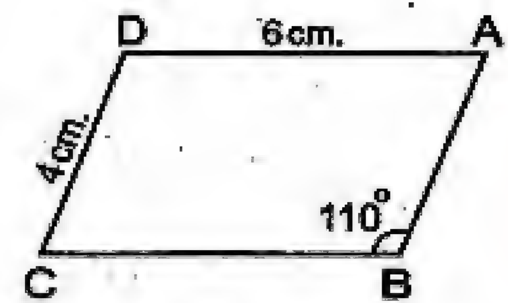
(6) A cube of edge length 5 cm. , then its volume = ... cm^3

(7) If $\frac{2}{5} = \frac{x}{20}$, then x = ...

(8) If the volume of a cuboid is 64 cm^3 and the area of its base is 16 cm^2 , then its height = ... cm.

3 **Answer the following :**

(1) **In the opposite figure :**



ABCD is a parallelogram , find :

[a] m (∠ D) [b] m (∠ A)

[c] The length of $\overline{AB}$ [d] The perimeter of the shape ABCD

....

....

(2) If the buying price of electric sets is L.E. 72 000 and sold at 15 % profit. Calculate the selling price.

....

....

(3) A cuboid tin with inner dimensions 2 dm. , 3 dm. and 4 dm. was full of honey. Calculate the price of honey , given that the price of one litre is L.E. 20

....

....

(4) In one of our schools , there are 1 000 students , if the ratio between the number of boys and the number of girls is 2 : 3 , find each of the number of boys and girls.

....

....

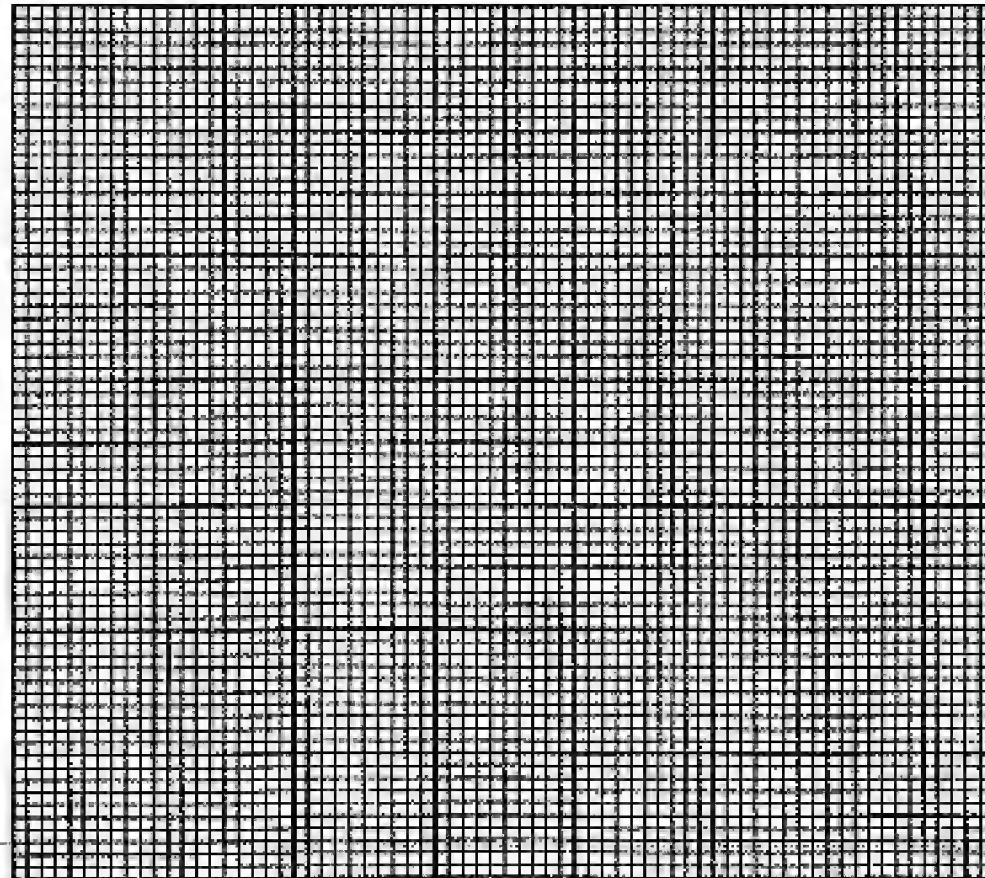
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(5) The following table shows the marks of 50 students in one month in maths :

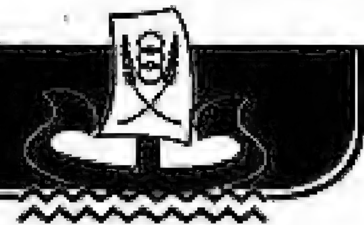
Marks	10 –	20 –	30 –	40 – 50	Total
Number of students	6	10	20	14	50

Represent these data by the frequency curve.



13 Kafr El-Sheikh Governorate

Maths Inspection



Answer the following questions :

1 Choose the correct answer between brackets :

(1) If the values in the frequency distribution lies between (40 , 90) , then the range of this distribution = ... (130 *or* 50 *or* 80 *or* 180)

(2) If 5 , 6 , x and 12 are proportional numbers , then x = ...

(8 *or* 12 *or* 5 *or* 10)

(3) An agricultural machine ploughs 17 feddans in 8.5 hours , then the rate of performance of the machine = ... feddans/hour

(2 *or* 4 *or* 2.5 *or* 4.5)

(4) If a : b = 50 % and b : c = 2 : 3 , then a : c = ...

(1 : 2 *or* 2 : 3 *or* 2 : 6 *or* 3 : 1)

(5) If the volume of a cuboid equals 360 cm^3 , its length is 9 cm. and its width is 8 cm. , then its height = ... cm. (5 *or* 40 *or* 48 *or* 72)

(6) If one angle of the parallelogram is right angle , and has two adjacent sides are equal in length , then it is called ....

(trapezium *or* square *or* rectangle *or* rhombus)

(7) The ratio between the side length of the square and its perimeter = ...

(4 : 1 *or* 1 : 4 *or* 1 : 3 *or* 1 : 6)

(8) If the drawing scale < 1 , then it expresses ....

(enlargement *or* congruency *or* reduction *or* equivalent)

(9) 4.250 cm^3 = ... mm^3 (4 250 *or* 42.5 *or* 0.425 *or* 4.25)

(10) $3\frac{4}{7} : 3\frac{1}{8}$ = ... (7 : 8 *or* 8 : 7 *or* 1 : 4 *or* 1 : 1)

(11) If the price of some goods is L.E. 256 and if the price became L.E. 192 during the discount , then the percentage of the discount equals ....

(16 % *or* 75 % *or* 33 % *or* 25 %)

(12) ABCD is a parallelogram , then m (∠ A) + m (∠ B) = ... °

(90 *or* 108 *or* 180 *or* 360)



2 Complete each of the following :

(13) Emad sold a flat with profit 5 % , if his profit was L.E. 7 500 , then the selling price of the flat is L.E. ....

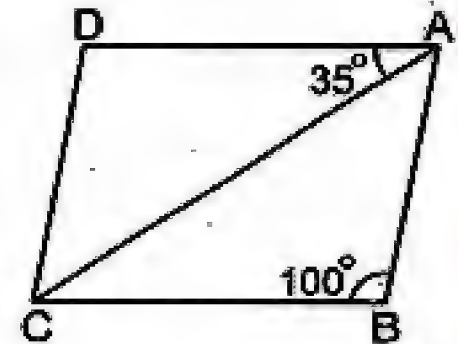
(14) 32 % + 27 % + ... % = 1

(15) $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$ = ... : .... : .... (in the simplest form)

(16) In the opposite figure :

ABCD is a parallelogram , then

m (∠ ACD) = ...°



(17) If the drawing scale is 1 : 500 000 and a road of real length 12.5 km. , then the length of the road on the map is .... cm.

(18) The volume of a cuboid is 64 cm^3 and the area of its base is 16 cm^2 , then its height = ... cm.

(19) The following figure in the pattern ☐ ☐ ☐ is ....

(20) The following table shows the marks of 40 students in a test , then the number of students who got less than 30 marks = ...

Marks	10 –	20 –	30 – 40
Number of students	10	13	17

3 Answer the following :

(21) A cube of cheese with edge length 15 cm. , it is wanted to divide it into small cuboids each of dimensions 3 cm. , 5 cm. and 1 cm. Find the number of resulting small cuboids of cheese.

....

....

....

(22) The ratio between the measures of two consective angles in a parallelogram is 4 : 5 Find the measure of each of them.

....

....

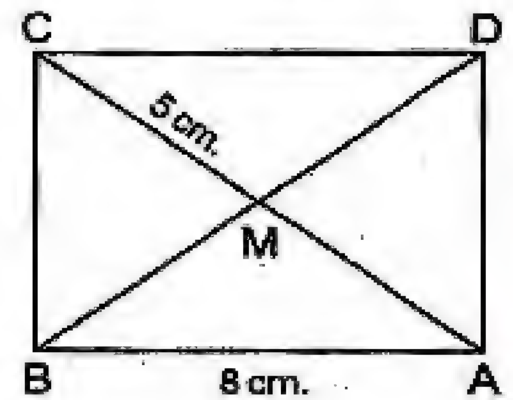
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(23) Three persons shared in a business , the first paid L.E. 60 000 , the second paid L.E. 80 000 and the third paid L.E. 90 000 At the end of the year the profit was L.E. 20 700 Find the share of each one.

....
....
....
....
....
....

(24) **In the opposite figure :**



ABCD is a rectangle in which AB = 8 cm.

and MC = 5 cm. Find :

[a] Length of $\overline{AM}$ [b] Length of $\overline{DB}$

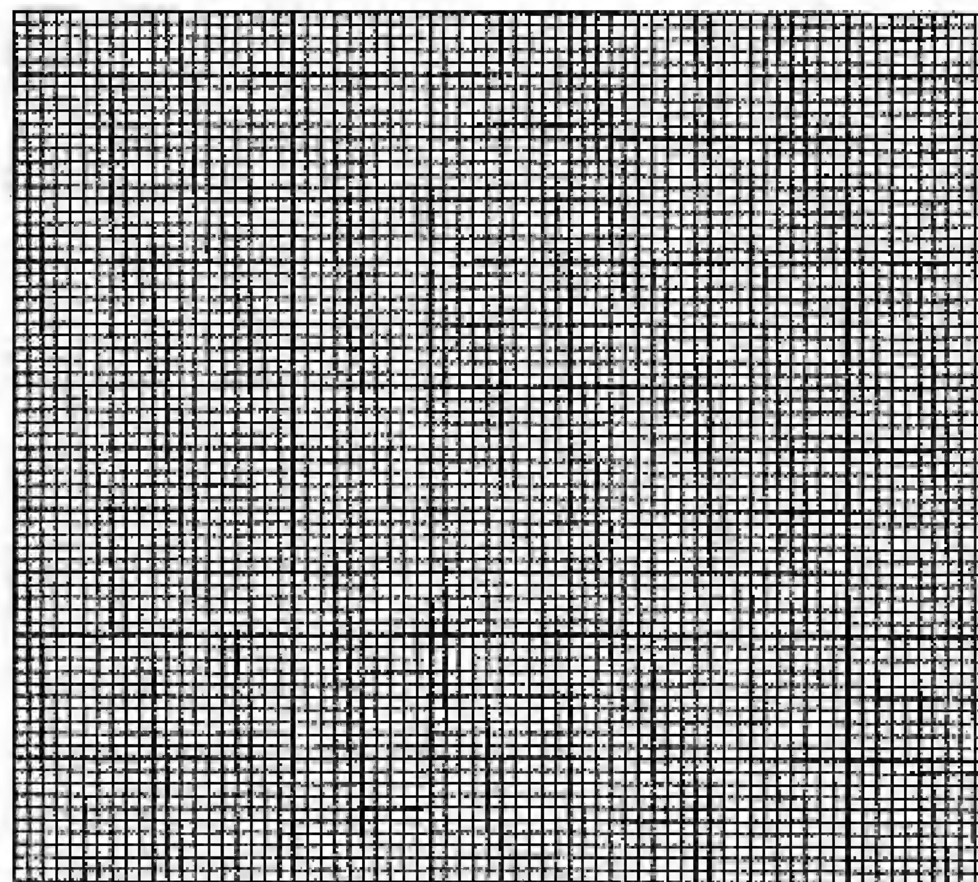
[c] Perimeter of Δ AMB

....
....
....

(25) **The following table shows the marks of 30 pupils in mathematics :**

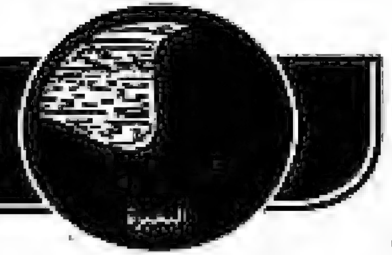
Marks	10 –	20 –	30 –	40 –	Total
Number of students	5	7	10	8	30

Draw the frequency curve for this distribution.



14 El-Beheira Governorate

Rashid Educational Zone
Rashid Language School



Answer the following questions :

1 Choose the correct answer :

(1) $1\frac{3}{4}$ = ... % (25 or 50 or 75 or 175)

(2) If 6 , 8 , 3 and x are proportional numbers , then x = ...
(2 or 4 or 18 or 24)

(3) 6 500 dm^3 = ... m^3 (6.5 or 65 or 605 or 650)

(4) $\frac{1}{2}$: $\frac{1}{3}$ = ... : .... (1 : 1 or 2 : 3 or 3 : 2 or 3 : 1)

(5) The ratio between the side length of the square and its perimeter
= .... : .... (1 : 1 or 1 : 3 or 1 : 4 or 4 : 1)

(6) The diagonals are perpendicular and equal in length in ....
(parallelogram or rectangle or rhombus or square)

(7) If the height of the fence of the villa in the design is 5 cm. and its real height is 5 metres , then the drawing scale is .... : ....
(1 : 1 or 1 : 10 or 1 : 100 or 1 : 1 000)

(8) The percentage is a ratio which its second term is ....
(10 or 100 or 1 000 or 0.01)

(9) The volume of a cube of edge length 3 cm. = ... cm^3
(8 or 27 or 64 or 125)

(10) If a : b = 2 : 3 and b : c = 3 : 5 , then a : c = ... : ....
(2 : 5 or 3 : 5 or 5 : 2 or 5 : 3)

(11) If the ratio between the weight of Hani and the weight of Ahmed is 5 : 6 and the weight of Ahmed is 60 kg. , then the weight of Hani = ... kg.
(40 or 50 or 60 or 10)

(12) The opposite data are quantitative data except ....
(weight or age or temperature degrees or blood species)



2 Complete the following :

(13) The proportion is ....

(14) 3 000 gm. : 5 kg. = ... : .... (in the simplest form)

(15) If the drawing scale < 1 , then this expresses ....

(16) The following figure in this pattern [figure] [figure] [figure] is ....

(17) The volume of a cuboid with a squared base of side length 6 cm. and its height is 10 cm. = ... cm^3

(18) If the percentage of the number of girls in a class which mixed is 67 % , then the percentage of the number of boys in this class = ...

(19) A computer colour printer prints 12 papers each 4 minutes , then the rate of work of this printer = ... papers/minutes

(20) The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

3 Answer the following :

(21) A primary school has 540 pupils. If the ratio between the number of boys to the number of girls is 4 : 5 , calculate the number of each boys and girls.

....

....

....

....

....

(22) **In the opposite figure :**

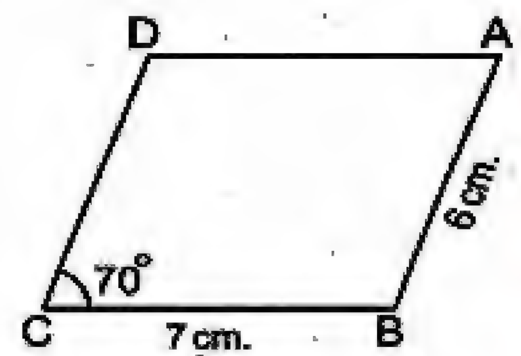
ABCD is a parallelogram in which AB = 6 cm.

, BC = 7 cm. and m (∠ C) = 70°

Find :

[a] m (∠ D) = ...

[b] AD = ... cm.



(23) A company for selling the electric sets. It shows TV set for L.E. 2 100 , if the percentage of the profit is 12 % Find the buying price of TV set.

....

....

....

....

(24) A container has 12 litres of honey. It is wanted to put them in smaller bottles , the capacity of each of them is 400 cm^3. Calculate the number of bottles which is needed for that.

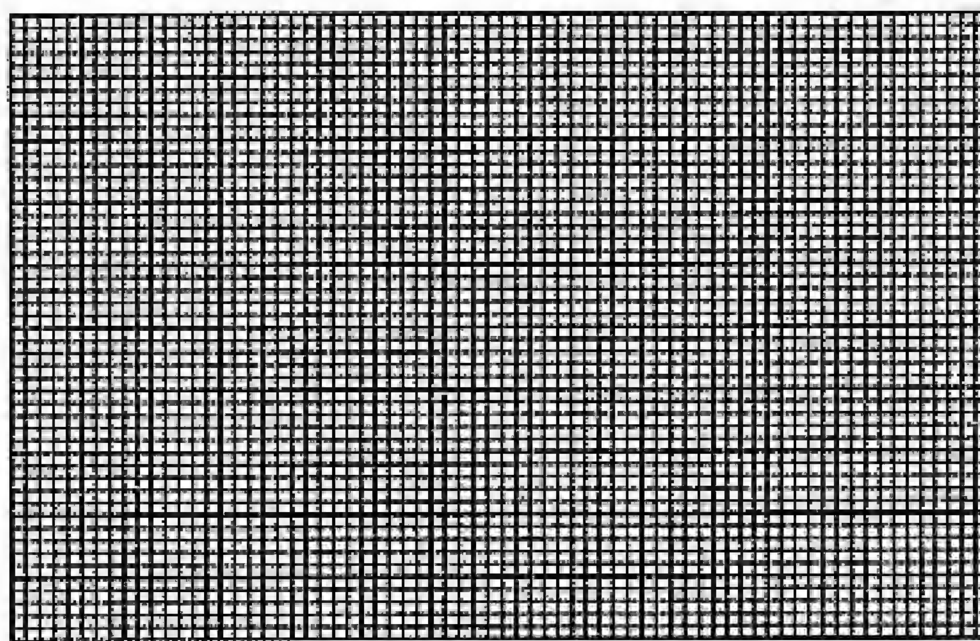
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(25) The following table shows the marks of students in one month in math :

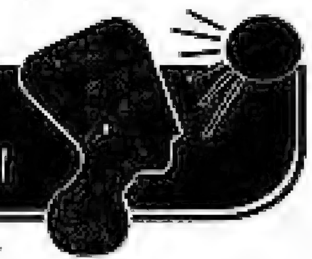
Marks	10 –	20 –	30 –	40 – 50	Total
Numbers of students	5	15	20	10	50

Represent these data using the frequency curve.



15 El-Menia Governorate

El-Menia Educational Zone
Kafr El-Mansorah Formal Languages Primary School



Answer the following questions :

1 Choose the correct answer :

(1) If 3 a = 4 b , then , $\frac{a}{b}$ = ... ($\frac{3}{4}$ or $\frac{2}{3}$ or $\frac{4}{3}$ or $\frac{3}{2}$)

(2) If $\frac{4}{6} = \frac{12}{x}$, then $x + 2$ = ... (16 or 18 or 20 or 22)

(3) 300 grams : $1\frac{1}{2}$ kilogram = ... : ....
(1 : 3 or 1 : 5 or 10 : 1 or 10 : 30)

(4) 1 – (35 % + 25 %) = ... ($\frac{1}{2}$ or $\frac{1}{3}$ or $\frac{2}{5}$ or $\frac{3}{4}$)

(5) The ratio between the circumference of the circle and its diameter length is .... ($\frac{\pi}{2}$ or π or $\frac{1}{\pi}$ or 2π)

(6) 300 cm^3 + 3.7 litres = ... litres (6.7 or 4 or 3.6 or 303.7)

(7) An agricultural machine ploughs 6 feddans in 3 hours, then the rate of performance of the machine is .... feddans/hour
(2 or 15 or 3 or 25)



(8) $\frac{1}{6}$: 3 $\frac{1}{3}$ in the simplest form is ....

(1 : 20 *or* 2 : 15 *or* 2 : 5 *or* 1 : 5)

(9) If the volume of a cuboid = 40 cm^3 , and its height = 4 cm. , then the area of its base = ... (10 cm. *or* 10 cm^2 *or* 160 cm^2 *or* 160 cm.)

(10) The sum of measure of two consecutive angles in a parallelogram = ...

(60° *or* 90° *or* 180° *or* 360°)

(11) The two diagonals are equal in length and not perpendicular in ....

(rectangle *or* rhombus *or* triangle *or* square)

(12) The following data are descriptive except ....

(favourite colour *or* age *or* birth place *or* name)

2 Complete the following statements :

(1) If the real length of an insect is 0.3 mm. and its length in a picture is 4.5 cm. , then the drawing scale = ... : ....

(2) $\frac{3}{10}$ = ... %

(3) The ratio between 3 feddans : 40 kirats = ... : ....

(4) If A : B = 2 : 3 , B : C = 3 : 5 , then A : C = ... : .... (in the simplest form)

(5) 39 days ≃ .... week. (to the nearest week)

(6) The sum of all edges of a cube is 24 cm. , then its volume = ... cm^3

(7) △ ○ △ △ ○ ○ △ △ △ .... (in the same pattern)

(8) The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

3 Answer the following questions :

(1) If the buying price of electric sets is L.E. 72 000 and sold at 12 % profit Calculate the selling price.

....

....

....

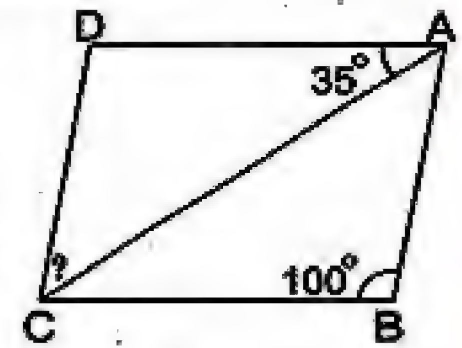
(2) If the ratio among the measures of the angles of a triangle is 2 : 3 : 4 Find the measure of the greatest angle in this triangle.

....

....

....

(3) **In the opposite figure :**



ABCD is a parallelogram in which

, m (∠ B) = 100° , m (∠ DAC) = 35°

Find : m (∠ ACD)

....

(4) A cuboid tin with inner dimensions 2 dm. , 3 dm. and 4 dm. was full of honey. Calculate the price of honey , given that the price of one litre is L.E. 20

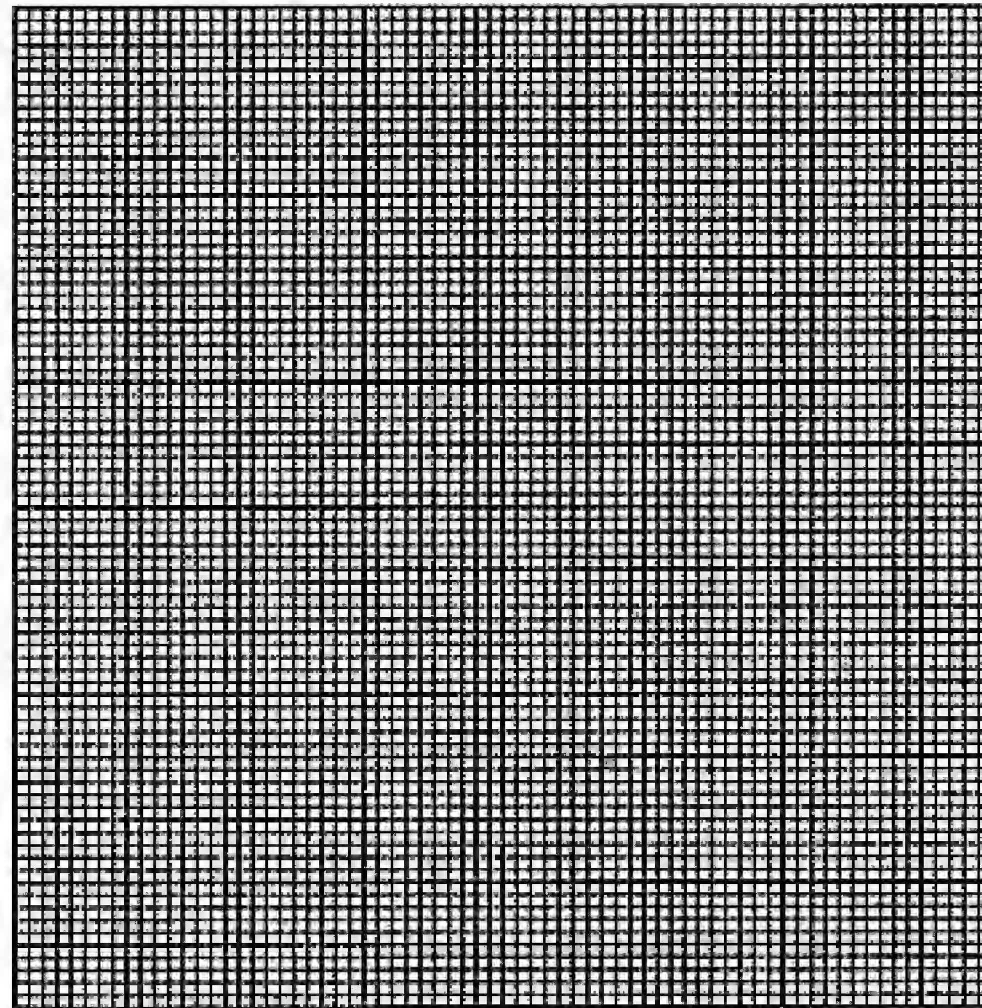
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(5) **The following table shows the marks of 100 students in one month in math test :**

Marks	10 –	20 –	30 –	40 – 50	Total
Number of students	15	30	40	15	100

Draw the frequency curve of this distribution.



16 Souhag Governorate

Maths Supervision



Answer the following questions :

1 Choose the correct answer :

(1) If a : b = 2 : 3 , b : c = 6 : 7 , then a : c = ...

(7 : 4 or 4 : 7 or 12 : 7 or 6 : 7)

(2) The range of the values 7 , 3 , 6 , 15 and 10 is ....
(4 or 7 or 12 or 15)

(3) If $\frac{x}{9} = \frac{4}{3}$, then $x + 2 =$ .... (12 or 14 or 16 or 20)

(4) 1 – (35 % + 25 %) = ... ($\frac{1}{2}$ or $\frac{1}{3}$ or $\frac{2}{5}$ or $\frac{3}{4}$)

(5) The ratio between 3 feddans : 24 kirats = ...
(3 : 2 or 3 : 1 or 1 : 8 or 1 : 4)

(6) The number of parallelograms in the opposite figure is ....



(9 or 7 or 5 or 4)

(7) If the volume of a cuboid = 300 cm^3 , its base area = 25 cm^2 , then its height = ... cm. (12 or 13 or 14 or 15)

(8) 250 gm. : $\frac{1}{2}$ kg. = ... (2 : 1 or 1 : 2 or 1 : 5 or 5 : 1)

(9) A cube of volume 125 cm^3 , then the area of its base = ...
(25 cm^2 or 25 cm. or 5 cm^2 or 5 cm.)

(10) The following data are descriptive except the ....
(favourite colour or birth place or age or blood species)

(11) In the opposite figure :
The number of trapezoids is ....



(2 or 4 or 3 or 5)

(12) 23 cm^3 = ... litres. (0.23 or 2 300 or 0.023 or 230)

2 **Complete each of the following :**

(1) $\frac{1}{4} : \frac{1}{3} : \frac{1}{2}$ = ... : .... : .... (in the simplest form)

(2) If the drawing scale > 1 , then this expresses ....

(3) △ ○ △ △ ○ ○ △ △ △ .... (in the same pattern)

(4) The difference between the maximum value and the minimum value is called ....

(5) The number of edges of a cube = ... edges.

(6) Area of the square = side length × ....

(7) 300 mm^3 = ... cm^3

(8) From the properties of the proportion , the product of the extremes = the product of the ....

3 **Answer the following questions :**

(1) A metallic cube of edge length 12 cm. , it needs to be converted it into ingots in the shape of cuboid each of them of dimensiona 3 cm. , 4 cm. and 6 cm.
Calculate the number of ingots that are obtained.

....

....

....

(2) The ratio among the lengths of the sides of a triangle is 2 : 3 : 4 and the preimeter of the triangle = 36 cm.
Calculate the length of each side of the triangle.

....

....

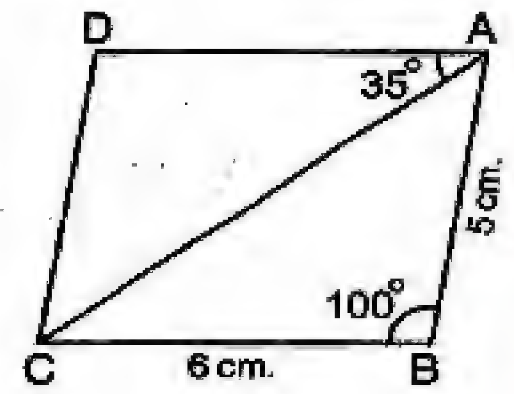
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(3) **In the opposite figure :**

ABCD is a parallelogram in which
AB = 5 cm. , BC = 6 cm. m (∠ B) = 100°
and m (∠ DAC) = 35° , without using measuring tools , find :



[a] m (∠ D) = ...°

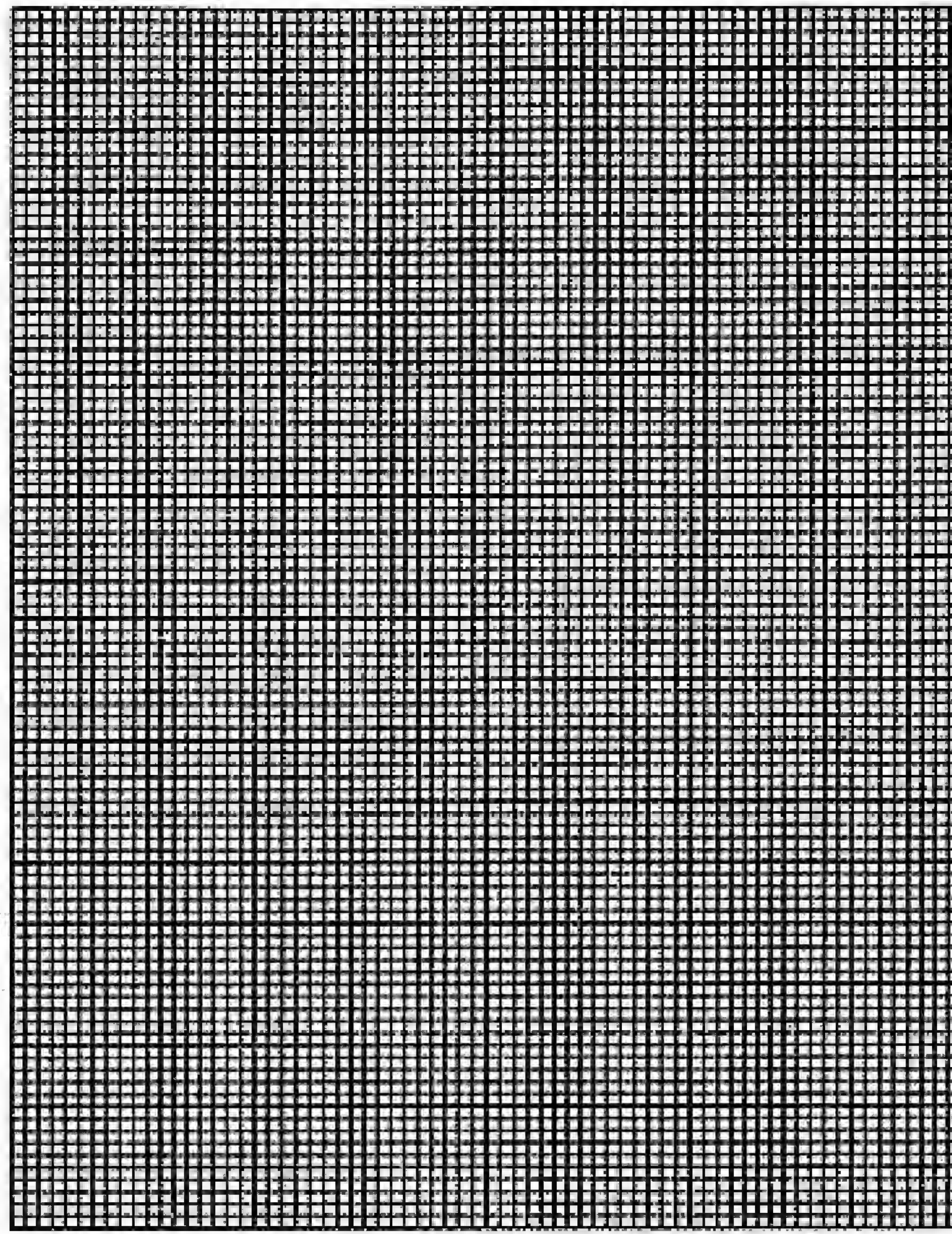
[b] m (∠ ACD) = ...°

[c] The perimeter of the parallelogram ABCD = ... cm.

(4) **The following table shows the ages of visitors to a museum during a certain period :**

Visitor's age	10 –	20 –	30 –	40 –	50 –	Total
Frequency	7	10	15	20	13	65

Draw the frequency curve for this distribution.



17 Qena Governorate
Maths Supervision



Answer the following questions :

1 Complete each of the following :

(1) 30 days ≃ .... weeks. (to the nearest week)

(2) $1\frac{3}{4}$ = ... %

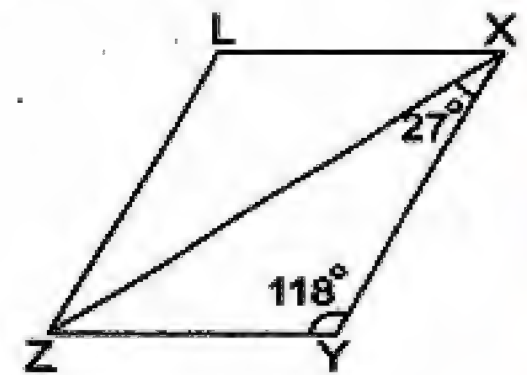
(3) If the volume of a cuboid is 64 cm^3 and the area of its base is 16 cm^2, then the height = ... cm.

(4) If x , 18 , 6 and 9 are proportional quantities , then x = ...

(5) If a : b = 2 : 3 and b : c = 3 : 5 , then a : c = ...

(6) If the marks of 6 pupils in one test are 29 , 33 , 57 , 40 , 36 , 49 , then the range of these marks = ...

(7) **In the opposite figure :**
XYZL is a parallelogram in which
m (∠ Y) = 118° and m (∠ YXZ) = 27° , then :
[a] m (∠ L) = ...°
[b] m (∠ LXZ) = ...°



(8) The area of the triangle = $\frac{1}{2}$ × .... × ....

2 **Choose the correct answer from those given :**

(9) The opposite data are descriptive except ....
(The favorite colour or birthday or age or blood species)

(10) 4.6 litres = ... mL. (46 or 460 or 4 600 or 46 000)

(11) $\frac{2}{3} : 3\frac{1}{3}$ = ... : .... (1 : 2 or 2 : 5 or 1 : 10 or 1 : 5)

(12) The volume of the cuboid whose dimensions are 2 cm. , 3 cm. , 5 cm.
= .... cm^3 (10 or 25 or 30 or 50)

(13) The centimetre cube is a unit for measuring ....
(the perimeter or the area or the volume or the length)

(14) If one of the angles of a parallelogram is right and two of its adjacent sides are equal in length , then it is called ....
(rhombus or square or triangle or rectangle)

(15) The drawing scale = $\frac{..............}{..............}$
($\frac{\text{length in reality}}{\text{length in drawing}}$ or $\frac{1}{\text{length in reality}}$ or $\frac{\text{length in drawing}}{\text{length in reality}}$ or $\frac{1}{2}$)

(16) A tractor ploughs 28 feddans in 4 hours , then the time which is needed to plough 42 feddans = ... hours. (4 or 6 or 7 or 8)

(17) $\frac{3}{4}$ = ... (as a decimal fraction) (0.2 or 0.5 or 0.25 or 0.75)

(18) 45 % = ... (as a fraction in the simplest form)
($\frac{45}{1\,000}$ or $\frac{9}{20}$ or $\frac{4}{10}$ or $\frac{5}{100}$)

(19) The ratio between 12 kirats and 2 feddans = ... : ....
(1 : 4 or 4 : 1 or 1 : 6 or 6 : 1)

(20) If a man distributed L.E. 200 among his three sons in the ratio 2 : 3 : 5 , then the share of the third = L.E. ....
(50 or 100 or 150 or 75)

3 **Answer the following :**

(21) A cube of metal its edge length is 12 cm. If it is wanted to be melted down and converted into alloys in the form of a cuboid with dimensions 3 cm. , 4 cm. , and 6 cm. Calculate the number of alloys that can be obtained.

....

....

....

(22) Ahmed draw a picture of his brother Osama with a drawing scale 1 : 40

If the real height of Osama is 160 cm. What is height in the picture ?

....

....

....

(23) A triangular garden in a school , the ratio between its side lengths is 3 : 4 : 5 , if the perimeter of the garden is 120 metres , calculate the length of each of the sides of the garden.

....

....

....

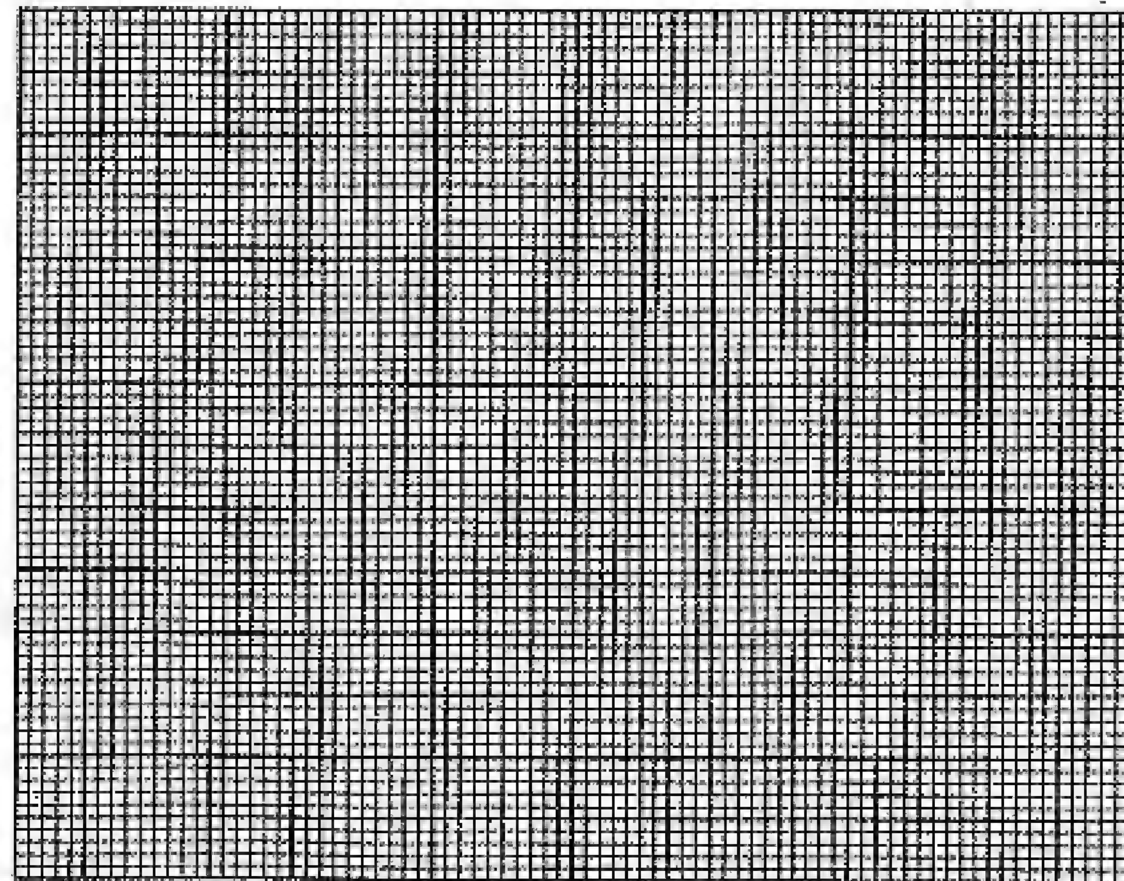
(24) The following table shows the extra money which 100 workers got in a month in a factory :

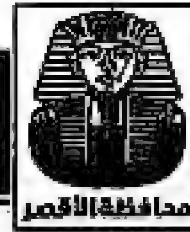
The extra money	20 –	30 –	40 –	50 –	60 –	70 –	Total
Number of workers	20	15	30	20	10	5	100

[a] Draw the frequency curve of this distribution.

[b] What is the number of workers who obtained extra money less than 50 pounds ?

....





18 Luxor Governorate

Luxor Educational Directorate
Maths Department

Answer the following questions :

1 Choose the correct answer :

(1) Parallelogram is a rectangle if one of its angles is ....
(right **or** acute **or** obtuse **or** straight)

(2) The ratio between the side length of the square to its perimeter is .... : .... (1 : 5 **or** 1 : 3 **or** 1 : 4 **or** 4 : 1)

(3) A car covers 240 km. in 3 hours , then the car speed is .... km./hour
(60 **or** 80 **or** 120 **or** 90)

(4) The simplest form of the ratio 2.4 : 18 = ... : ....
(2 : 15 **or** 1 : 6 **or** 6 : 7 **or** 5 : 3)

(5) In the proportion 6 , 8 , 3 , x , the value of x is ....
(5 **or** 7 **or** 4 **or** 3)

(6) All of the following are considered descriptive data except ....
(name **or** age **or** address **or** hobbies)

(7) 16 000 cm^3 = ... litres. (1.6 **or** 16 **or** 160 **or** 0.16)

(8) $\frac{2}{5}$ = ... % (20 **or** 40 **or** 60 **or** 10)

(9) If a : b = 2 : 3 and b : c = 5 : 6 , then a : c = ... : ....
(5 : 9 **or** 9 : 7 **or** 5 : 8 **or** 15 : 11)

(10) The sum of all edge lengths of a cube is 84 cm.
, then its volume is .... cm^3. (49 **or** 343 **or** 28 **or** 14)

(11) 15 % of 400 = ... (40 **or** 70 **or** 80 **or** 60)

(12) 2 kg. : 3 500 gm. = ... : .... (2 : 3 **or** 7 : 6 **or** 4 : 7 **or** 5 : 4)

2 Complete the following :

(1) The range of the set of values 7 , 3 , 8 , 9 and 5 is ....

(2) Diagonals are equal in length in each of .... and ....

(3) If the drawing length is 3 cm. and the real length is 18 m. , then the drawing scale is .... : ....

(4) The volume of a cuboid is 720 cm^3 , and its height is 9 cm. , then its base area is .... cm^2.

(5) If the buying price of some goods is L.E. 2 000 and it sold for L.E. 1 800 , then the percentage of loss is .... %

(6) If $\frac{2}{5} = \frac{8}{x}$, then x = ...

(7) 1 – 70 % = ... %

(8) The simplest form of the ratio 12 : 18 : 36 = ... : .... : ....

3 Answer the following :

(1) The ratio between Mina's age and Ahmed's age is 7 : 11 , and the difference between their ages is 8 years , find the age of each of them.

....

....

....

....

(2) A picture of a tree is drawn with a drawing scale 1 : 100 , if the real height of the tree is 8 m. , find its length in the picture.

....

....

....

....

(3) A swimming pool is in the shape of cuboid whose internal dimensions are 40 m. , 30 m. and 1.8 m. , find its capacity in litre.

....

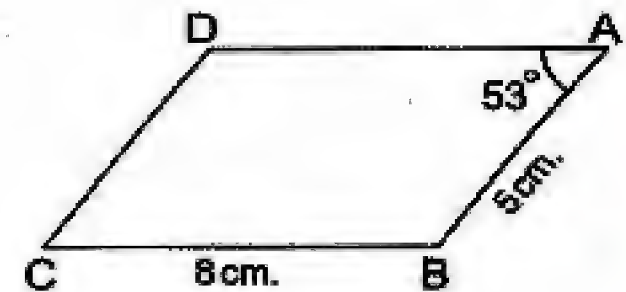
....

(4) In the opposite figure :

ABCD is a parallelogram in which AB = 5 cm. , BC = 8 cm. and (∠ A) = 53° Find :

[a] m (∠ B)

[b] The length of $\overline{AD}$ and the length of $\overline{DC}$



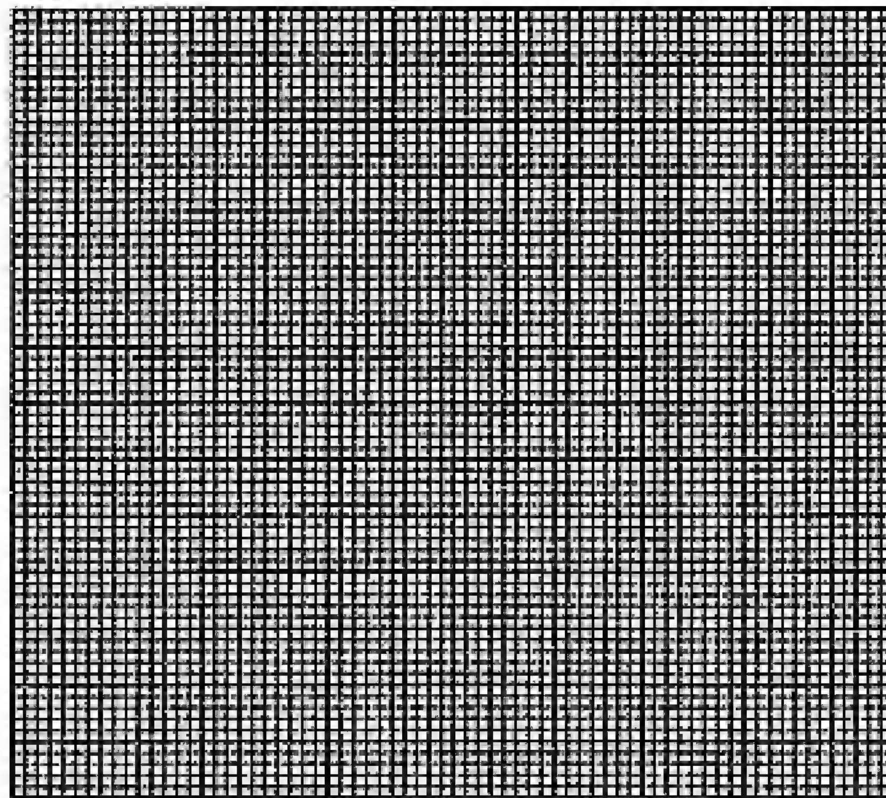
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....

(5) The following table shows the ages of visitors to an exhibition within an hour of a day :

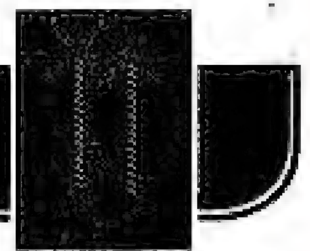
Visitor's age	10 –	20 –	30 –	40 –	50 –	Total
Number of visitors	6	9	12	10	8	45

Draw the frequency curve for this distribution.



19 Aswan Governorate

Aswan Educational Directorate
Eng. M.M. Yacoub Formal Language School



Answer the following questions :

1 Choose the correct answer of the following :

(1) The following data are quantitative except ....
(age or weight or name)

(2) If the sum of the edge lengths of a cube is 36 cm. , then its volume = ... cm^3 (3 or 27 or 12)

(3) If a : b = 2 : 3 , b : c = 6 : 7 , then a : c = ...
(7 : 4 or 12 : 7 or 4 : 7)

(4) 12 dm^3 = ... cm^3 (1 200 or 12 000 or 120)

(5) $\frac{2}{3} : 3\frac{1}{3}$ = ... : .... (1 : 5 or 2 : 3 or 2 : 5)

(6) If one angle of a parallelogram is right , then it called a ....
(rectangle or square or rhombus)

(7) $1\frac{3}{4}$ = ... % (75 or 175 or 25)

(8) An agricultural tractor ploughs 28 feddans in 4 hours , the time that needed to plough 42 feddans is .... hours. (4 or 12 or 6)

(9) If $\frac{x}{18} = \frac{4}{6}$, then x + 1 = ... (13 or 11 or 12)

(10) If length of an insect in a picture is 40 cm. , and the real length is 2 mm. , then the drawing scale is .... (200 : 1 or 20 : 1 or 1 : 200)

(11) If a car covered 280 km. in 4 hours , then the rate of covered distance per hour = ... km./hr. (7 or 70 or 700)

(12) Two wires , the ratio between their lengths is 3 : 4 and their sum is 140 cm. , then the length of the second wire is .... cm. (30 or 40 or 80)



2 Complete each of the following :

(1) The following figure in this pattern [figure] [figure] [figure] is ....

(2) Drawing scale = $\frac{\text{............}}{\text{............}}$

(3) If the volume of a cuboid is 560 cm^3 and its height is 8 cm. , then its base area is .... cm^2

(4) If the marks of 5 pupils in a test are 36 , 40 , 57 , 29 and 33 , then the range of marks is ....

(5) 1 – (25 % + 30 %) = ... %

(6) 80 minutes : 2 hours = ... : .... (in the simplest form)

(7) A map is drawn with a scale 1 : 200 000 , if the distance between two cities is 8 km. in reality , then the length between them on that map is ....

(8) The ratio between length of side of an equilateral triangle and its perimeter = ... : ....

3 Answer the following :

(1) Two persons started a commercial business , the first paid L.E. 5 000 and the second paid L.E. 8 000 , at the end of the year the profit was L.E. 3 900 Calculate the share of each of them from profit.

....

....

....

(2) A container has 16 litres of oil , it is wanted to put them in small bottles , the capacity of each of them is 400 cm^3 Calculate the number of bottles.

....

....

....

(3) If buying price of electric sets is L.E. 72 000 and sold at 12 % profit. Calculate the selling price.

....

....

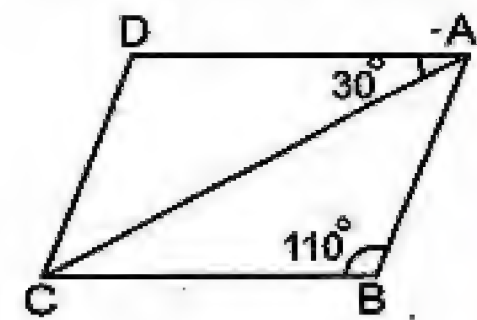
....

(4) In the opposite figure :

ABCD is a parallelogram , then find :

[a] m (∠ D) = ... °

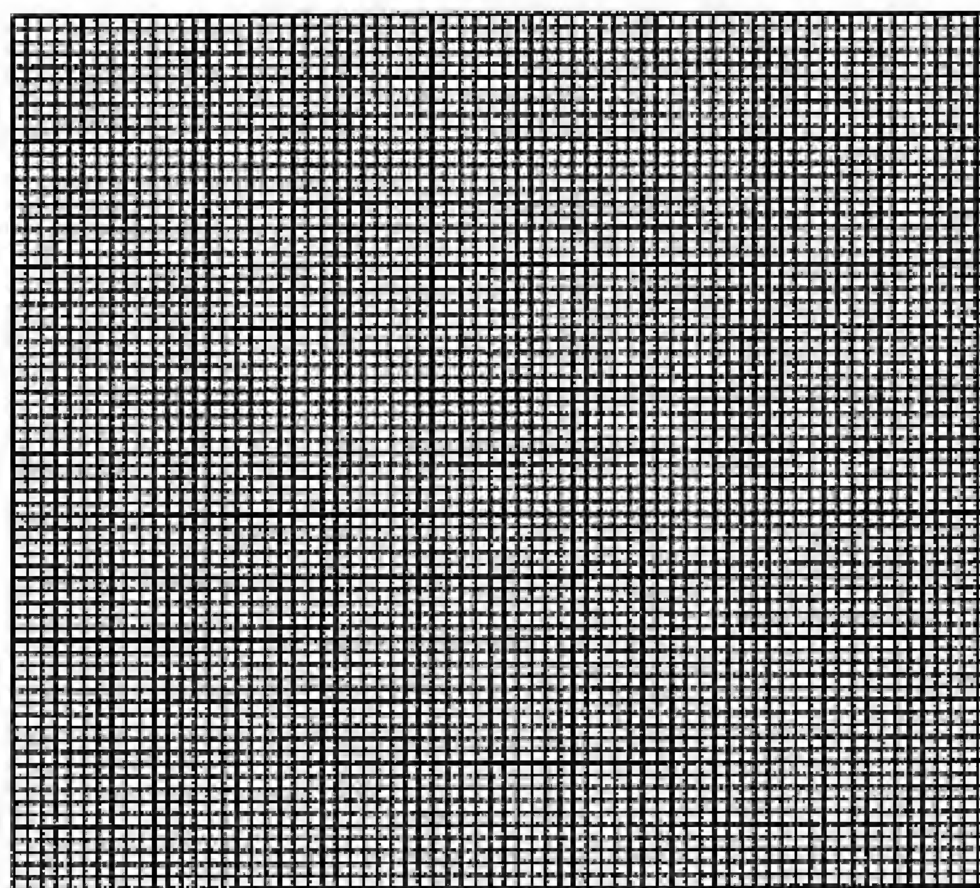
[b] m (∠ ACD) = ... °



(5) The following table shows the number of hours which spent by 40 pupils to study their lessons daily :

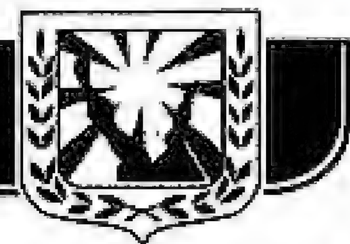
Number of hours	1 –	2 –	3 –	4 –	5 – 6	Total
Number of pupils	6	3	8	12	11	40

Represent these data using the frequency curve.



20 South Sinai Governorate

El-Tur Educational Zone
Maths Inspection



Answer the following questions :

1 Choose the correct answer :

(1) If 2 , 5 , x and 15 are proportional , then x = ...
(2 or 5 or 6 or 15)

(2) The percentage is a ratio its second term is ....
(10 or 100 or 1 000 or 10 000)

(3) 3 litres = ... cm^3 (3 or 30 or 300 or 3 000)

(4) If the ratio between a child's age to his father's age is 2 : 13 and the child's age is 6 years , then father's age = ... years.
(6 or 15 or 39 or 41)

(5) The ratio between the two numbers 1.6 and 1.8 = ... : ....
(1 : 4 or 8 : 9 or 3 : 8 or 1 : 16)

(6) The number of edges of the cube .... the number of faces of the cuboid. (> or < or = or ≤)

(7) A merchant bought a TV set for L.E. 1 800 and he sold it for L.E. 2 000, then his profit = L.E. .... (1 800 or 800 or 200 or 3 800)

(8) The range of the set of values 7, 3, 6, 9 and 5 is ....
(4 or 2 or 6 or 12)

(9) If the real length is 6 m. and the drawing length is 6 cm., then the drawing scale = ... : .... (1 : 10 or 1 : 100 or 1 : 1 000 or 1 : 6)

(10) Antecedent of the ratio 3 : 11 is .... (3 or 5 or 11 or 2)

(11) An agricultural tractor ploughs 28 feddans in 4 hours, then its rate of performance = ... feddans / hour (4 or 6 or 7 or 8)

(12) If one of the angles of a parallelogram is right angle, then it is called ....
(a square or a rectangle or a rhombus or a triangle)

2 Complete :

(1) $\frac{3}{4}$ = ... %

(2) The ratio between the side length of the square and its perimeter = ... : ....

(3) If the volume of a cuboid is 64 cm^3 and the area of its base is 16 cm^2, then its height = ... cm.

(4) 250 grams : $\frac{1}{2}$ kilogram = ... : .... (in the simplest form)

(5) If the drawing scale < 1, this expresses ....

(6) If a : b = 2 : 3 , b : c = 3 : 5 , then a : c = ... : ....

(7) 4 m^3 = ... dm^3

(8) The data : the age, the length, the weight and the favorite color are quantitative data except ....

3 Answer the following :

(1) Nahed bought an automatic washing for L.E. 3 600 and the discount was 10 % Calculate the original price of the washing machine before discount.

....

....

....

(2) The ratio among the measures of the angles of a triangle is 2 : 3 : 4
Find the measure of each angle in the triangle.

....

....

....

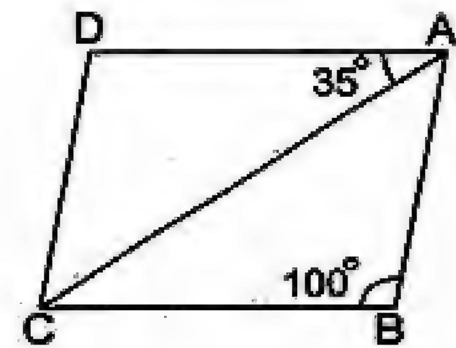
(3) A vessel in the shape of a cube with edge length 15 cm. is filled with honey.
Calculate the capcity of the vessel of the honey.

....

....

....

(4) **In the opposite figure :**



ABCD is a parallelogram , find :

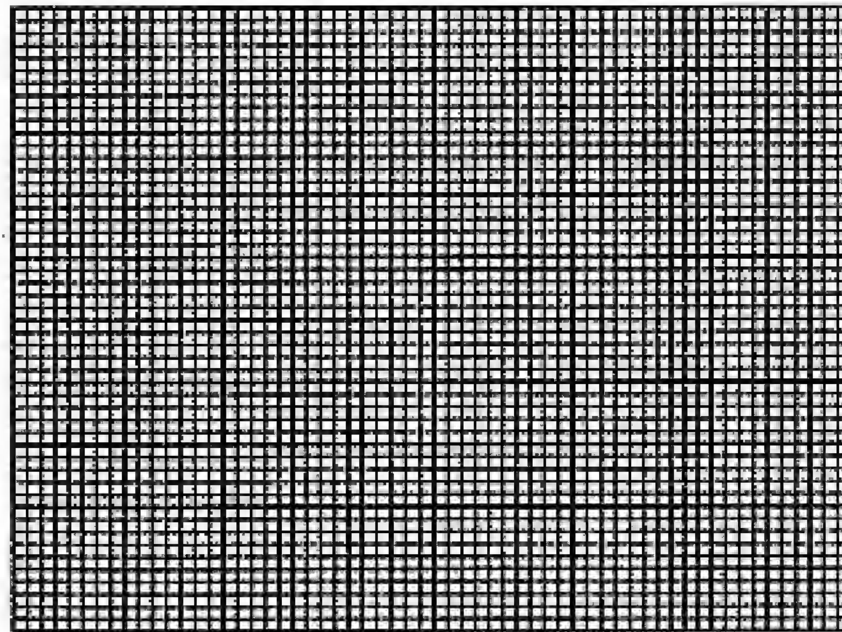
[a] m (∠ BAC) = ...°

[b] m (∠ D) = ...°

(5) **The following table shows the marks of 100 students in one maths test :**

Marks	10 –	20 –	30 –	40 –	Total
Number of students	15	30	40	15	100

Draw the frequency curve of this distribution.



Some Governorates Examinations for the Year 2017



1 Cairo Governorate (2017)

Answer the following questions : (Calculator is allowed)

1 Complete the following :



[a] If $\frac{x}{8} = \frac{3}{4}$, then $x =$ ....

[b] $\frac{2}{5} =$ .... %

[c] The quadrilaterals in which its diagonals are equal in length and bisect each other are called .... and ....

[d] The difference between the greatest value and the smallest value in a set of individuals is called ....

2 Choose the correct answer from those given :

[a] If the volume of a cuboid is 24 cm^3 and the area of its base is 6 cm^2 , then its height = ... cm. (3 or 4 or 12 or 18)

[b] The following data are descriptive except ....
(the colour or place of birth or age or blood species)

[c] 1 500 cm^3 = ... litre (0.15 or 1.5 or 15 or 150)

[d] If an agricultural machine ploughs 14 feddans in 3.5 hours , then the rate of performance of this machine is .... feddans/hour
($\frac{1}{4}$ or $2\frac{1}{2}$ or 4 or $10\frac{1}{2}$)

3 [a] If the distance between two cities on a map of drawing scale 1 : 500 000 equals 3 cm. Find the real distance between the two cities.

[b] The sum of the six faces areas of a cube is 54 cm^2.
Find : (1) Its edge length. (2) Its volume.

4 [a] The number of pupils of a primary school in the first , the second and the third grades is 240 pupils , if the ratio among the three grades is 5 : 4 : 3
Calculate the number of pupils in each grade of them.

[b] Heba bought an electric sweeping machine for L.E. 425 with discount 15 %
Calculate the original price of the sweeping machine before discount.

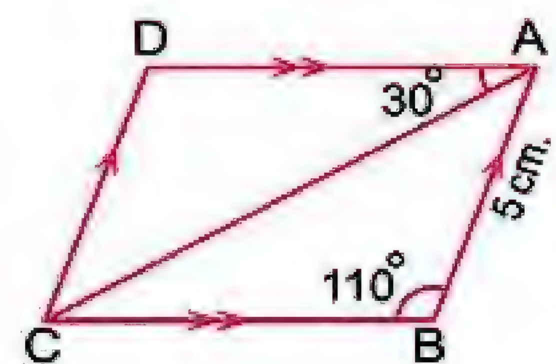


5 [a] ***In the opposite figure :***

ABCD is a parallelogram in which m (∠ B) = 110°

, m (∠ DAC) = 30° and AB = 5 cm.

Find : (1) The length of $\overline{CD}$ (2) m (∠ BAC)



[b] ***The following table shows the marks of 100 pupils in mathematics :***

Marks	10 –	20 –	30 –	40 –	50 –	Sum
Number of pupils	15	25	30	20	10	100

(1) Draw the frequency curve for this distribution.

(2) What is the number of pupils who get 30 marks or more ?

2 Giza Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Complete the following :***

[a] 1 – 30 % = ...

[b] If $\frac{2}{5} = \frac{x}{15}$, then x = ...

[c] The two diagonals are equal in length in each of .... and ....

[d] If the drawing scale < 1 , this expresses ....

2 ***Choose the correct answer :***

[a] If A : B = 2 : 5 , B : C = 5 : 9 , then A : C = ...

(5 : 2 or 2 : 9 or 5 : 7 or 2 : 11)

[b] The volume of the cube in which the sum of all its edge lengths is 36 = ... cm³.

(27 or 63 or 72 or 108)

[c] The range of the set of the values 7 , 3 , 6 , 9 and 5 is ....

(3 or 4 or 6 or 12)

[d] The opposite data are quantitative except the ....

(age or tallness or weight or favorite colour)

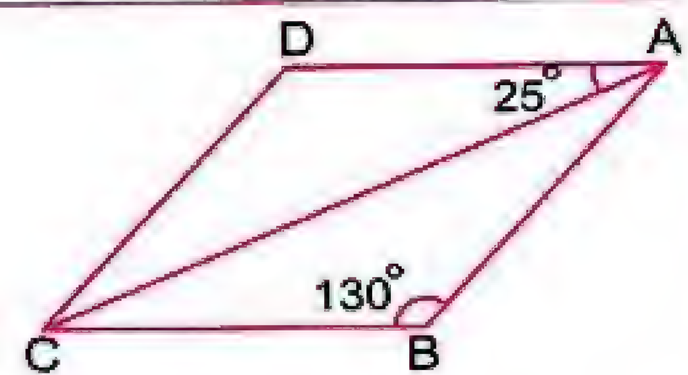
3 [a] If the length of Suez Canal on a map of scale drawing 1 : 1 100 000 is 15 cm. , then find its real length in km.

[b] A water tap is leaking 20 litres of water in 5 hours. Find the leaking rate of water per hour (Please advise them).

4 [a] A swimming pool in the shape of a cuboid whose internal dimensions are 40 m. , 30 m. and 1.8 m. Find its capacity in litres.

[b] In one of our schools , there are 560 students , if the number of girls = $\frac{3}{5}$ the number of boys. Find each of the number of boys and girls.

5 [a] *In the opposite figure :*



ABCD is a parallelogram in which
m (∠ B) = 130° and m (∠ DAC) = 25°
Find : (1) m (∠ D)
(2) m (∠ BAC)

[b] ***The following table shows sums of money in pounds was paid by a group of contributors in a goodness party :***

The sum	50 –	60 –	70 –	80 –	90 –	100 –
No. of contributors	5	7	10	12	10	7

(1) Draw the frequency curve of this distribution.
(2) What is the number of contributors by L.E. 80 and more ?

3 Alexandria Governorate (2017)



Answer the following questions :

1 ***Choose the correct answer :***

[a] In the following , the smallest number is ....
(0.5 or 0.25 or 0.125 or 0.375)

[b] If $\frac{2}{7} = \frac{x}{21}$, then x = ... (6 or 21 or 12 or 7)

[c] 4 200 000 cm³ = ... m³ (42 or 420 or 4.2 or 4 200)

[d] The opposite data are quantitative except ....
(tallness or age or number of sons or favorite food)

2 ***Complete the following :***

[a] 56 days = ... weeks.

[b] The ratio between $\frac{1}{2}$ kilogram and 700 grams = ... : ....

[c] If the values of a frequency distribution lie between (20 , 60) , then the range of this distribution = ...

[d] If one of the angles of the parallelogram is right and two of its adjacent sides are equal in length , then it is called ....

3 **[a]** In a class of a primary (mixed school) the number of boys = $\frac{4}{5}$ the number of girls , if the number of boys is 16 pupils , what is the number of the pupils in the class ?

[b] Ahmed drew a picture to his brother Osama with a drawing scale 1 : 40 If the real height of Osama is 160 cm. What is his height in the picture ?

4 **[a]** Find the buying price of goods sold for L.E. 21 520 and the percentage of profit is 15 % and find the profit.

[b] A cube of metal its edge length equals 12 cm. need to be melted down and converted into alloys in the form of a cuboid with dimensions 3 cm. , 4 cm. and 6 cm. Calculate the number of alloys that can be obtained.

5 **[a]** A cube-shaped vessel , its internal edge length is 30 cm. , it is filled with food oil :

(1) Calculate the capacity of food oil.

(2) If the price of one litre of food oil is 9.5 pounds. Calculate the price of all oil.

[b] ***The following table shows the marks of 100 pupils in math exam :***

Sets	10 –	20 –	30 –	40 –	50 –	Total
Frequency	15	25	30	20	10	100

Draw the frequency curve for this distribution.

4 El-Kalyoubia Governorate (2017)



Answer the following questions :

1 ***Complete the following :***

[a] If $\frac{a}{b} = \frac{4}{7}$, $\frac{b}{c} = \frac{7}{9}$, then a : b : c = ... : .... : ....

[b] A water tap is leaking 360 litres of water in an hour , then the leaking rate of water per minute = ... litres/minute

[c] The ratio between $2\frac{1}{4}$ km. and 125 m. = ... : ....

[d] The circumference of a circle = ...

2 ***Choose the correct answer :***

[a] If $\frac{x + 12}{8} = 2$, then x = ... (6 *or* 4 *or* 8 *or* 16)

[b] If the perimeter of a cube base is 36 cm. , then its volume = ... cm^3.
(36 *or* 6 *or* 729 *or* 216)

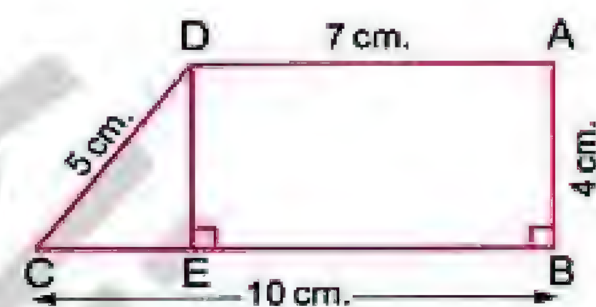
[c] 25 % of 1 000 = 50 % of ....
(2 000 *or* 1 500 *or* 1 250 *or* 500)

[d] If the real length of a tree is 6 m. and its drawing length is 3 cm. , then the drawing scale = ...
(1 : 100 *or* 1 : 200 *or* $\frac{1}{300}$ *or* 1 : 600)

3 **[a]** The ratio between the height of a building and the height of a tower is $\frac{4}{20}$
If the height of the building is 36 metres , find the height of the tower.

[b] A model for a football playground is drawn with a drawing scale 1 : 500 , if the dimensions of the playground in the model are 2 cm. and 4 cm.
Find : **(1)** The real dimensions of this playground in metres.
(2) The real area of this playground.

4 **[a]** ***In the opposite figure :***



ABCD is a trapezium in which m(∠ B) = 90°
, AD = 7 cm. , AB = 4 cm. , BC = 10 cm.
, DC = 5 cm. and ABED a rectangle , complete :

(1) AB = ... = ... cm.
(2) EC = ... cm.
(3) The perimeter of the triangle DEC = ... cm.

[b] A swimming pool is in the shape of a cuboid whose internal dimensions are 40 m. , 30 m. and 1.8 m. Find its capacity in litres.

5 **[a]** ABC is a right-angled triangle at B , if the ratio between the measures of the angles A and C is 2 : 3 , find the measure of each of the two angles.

[b] ***The following table shows the temperature degrees expected for 30 cities in one of the summer days :***

Temperature degree	24 –	28 –	32 –	36 –	40 –	44 –	Total
Number of cities	3	4	7	9	5	2	30

Draw the frequency curve of the previous table.

5 El-Sharkia Governorate (2017)



Answer the following questions :

1 *Choose the correct answer :*

[a] The rhombus has .... lines of symmetry.

(zero or 1 or 2 or 4)

[b] If the ratio 7 : 13 is the same ratio x : 52 , then x = ...

(14 or 21 or 28 or 35)

[c] The opposite data are descriptive except ....

(the favorite colour or birth place or blood species or age)

[d] 1.45 litre + 0.5 dm^3 + 50 cm^3 = ... litres

(51.95 or 2 or 2.45 or 3)

2 *Complete the following :*

[a] If 945 = (A × 100) + 45 , then A = ...

[b] The ratio between 12 kirats and $1\frac{1}{2}$ feddan (in the simplest form) is .... : ....

[c] If 87 is the greatest individual of a set and the range = 39 , then the smallest individual of this set equals ....

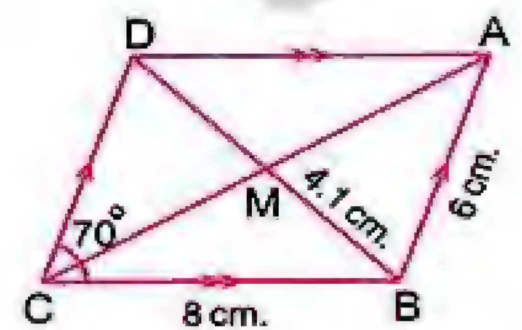
[d] The volume of a cuboid equals 400 cm^3 and its base is of length = 8 cm. and width = 5 cm. , then its height equals .... cm.

3 [a] A man distributed 6 300 pounds between his three sons , if the share of the first was third of the money and the ratio between the share of the second and the third is 3 : 2 Calculate the share of each of them.

[b] If the distance between two cities is 180 km. and the drawing scale is 1 : 9 000 000 How long is the distance between the two cities on the map ?

4 [a] Nahed bought a computer for L.E. 4 500 and the discount was 10 % Calculate the original price of the computer before discount.

[b] ***In the opposite figure :***



ABCD is a parallelogram in which AB = 6 cm. , BC = 8 cm. , BM = 4.1 cm. and m (∠ C) = 70°
Without using geometrical instruments ,
find : m (∠ ADC) , the perimeter of Δ BCD

5 [a] The sum of the lengths of all edges of a cube is 132 cm.
Calculate its volume.

[b] ***The following table shows the marks of 90 students in maths test :***

Marks	10 –	20 –	30 –	40 –	Total
Number of students	15	25	30	20	90

Draw the frequency curve for this data.

6 El-Monofia Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Choose the correct answer from those given :***

[a] $2.8\ dm^3 =$ .... litres (2.8 or 28 or 2 800 or 28 000)

[b] If $\frac{3}{4} = \frac{x}{20}$, then $5x =$ .... (15 or 20 or 75 or 5)

[c] The sum of the two numbers X and Y is 20 , then Y = ...
(20 + X or 20 – X or X – 20 or $\frac{X}{20}$)

[d] From the quantitative data is ....
(the favourite colour or favourite food or the age or social case)

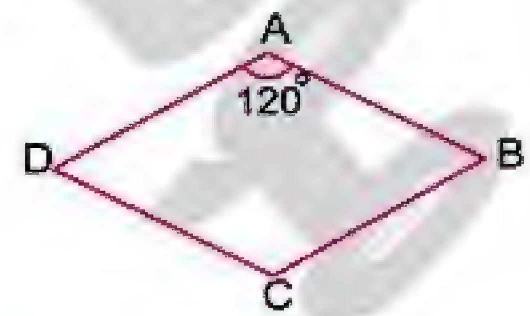
2 ***Complete the following :***

[a] A machine produces 240 pieces of certain materials in 3 hours
, then the rate of production of the machine = ... pieces/hour

[b] If the values of a frequency distribution the between (10 , 50) , then the range of this distribution = ...

[c] The triangle whose side lengths are 7 cm. , 7 cm. and 7 cm. is ....

[d] **In the opposite figure :**
ABCD is a rhombus
in which m (∠ A) = 120°
, then m (∠ B) = ...



3 [a] A garden in the shape of a square of side length 50 metres. It is drawn with a drawing scale 1 : 1 000
Find its area on the drawing in cm^2.

[b] Maher bought a car for L.E. 49 000 and he spent L.E. 1 000 for repairing it , then the sold it for L.E. 55 000 Calculate the percentage of profit.

4 **[a]** Find the volume of the cube in which the sum of lengths of all its edges is 36 cm.

[b] If the ratio between Ahmed's money and Mohamed's money is 7 : 4 and if Ahmed's money exceeds Mohamed's money by L.E. 60 Find the money with each of them.

5 **[a]** A cuboid its base is a square-shaped whose perimeter is 20 cm. and its height is 7 cm. Calculate its volume.

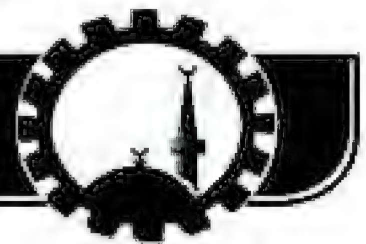
[b] ***On the orphan day , a group of students donated amounts of money in pounds shown in the following table :***

Money in pounds	3 –	5 –	7 –	9 –	11 –	Total
Number of students	7	10	15	10	8	50

(1) What is the number of students who donated by 9 pounds and more ?

(2) Draw the frequency curve for this frequency distribution.

7 El-Gharbia Governorate (2017)



Answer the following questions :

1 ***Choose the correct answer from those given :***

[a] The ratio between 3 feddans and 40 kirats equals ....
($\frac{3}{4}$ or $\frac{5}{9}$ or $\frac{9}{5}$ or $\frac{4}{3}$)

[b] If $\frac{5}{9} = \frac{15}{x}$, then x = ... (3 or 5 or 15 or 27)

[c] If one of the angles of the parallelogram is right and two of its adjacent sides are equal in length , then its is called ....
(rhombus or square or triangle or rectangle)

[d] The range of the set of values 5 , 4 , 8 , 12 and 7 is ....
(8 or 7 or 5 or 4)

2 ***Complete :***

[a] $\frac{2}{5}$ + 30 % = ... %

[b] The volume of a cuboid equals 400 cm^3 , its length is 8 cm. and its width is 5 cm. , then its height = ... cm.

[c] If the length in the drawing is 2 cm. and the real length is 20 metres. , then the drawing scale equals 1 : ....

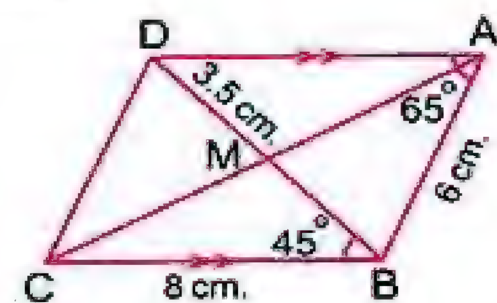
[d] All the following data [volume , area , length , blood type] are quantitative except ....

3 **[a]** If the ratio between Ahmed's money and Omar's money is 9 : 13 , if the sum with them is 440 pounds. Find the money with each of Ahmed and Omar.

[b] 10 litres of water were poured in a pot in the shape of a cuboid , its base is in the form of a square , its side length from the inside is 25 cm. Find height of the water in the pot.

4 **[a]** Abeer bought a TV set for 1 800 pounds and the discount was 10 % Calculate the original price of the TV set before discount.

[b] ***In the opposite figure :***



m (∠ BAD) = 65° , m (∠ DBC) = 45°
, AB = 6 cm. , CB = 8 cm. and MD = 3.5 cm.
Calculate without using measuring tools :

(1) m (∠ ABD) **(2)** m (∠ ADC) **(3)** Perimeter of Δ ABD

5 **[a]** If the length of the Suez Canal on a map of drawing scale 1 : 1 100 000 is 15 cm. Find its the real length in kilometres.

[b] ***The following table shows the marks of 50 students in English exam :***

Marks	0 –	5 –	10 –	15 –	20 –	Total
Number of students	4	8	20	12	6	50

(1) Draw the frequency curve.

(2) How many students who record less than 10 marks ?

8 El-Dakahlia Governorate (2017)



Answer the following questions :

1 ***Complete the following :***

[a] The capacity is ....

[b] A square , the length of its diagonal is (10 cm.) , then its area = ... cm^2.

[c] If (A is half B) and (B is twice C) , then A : C = ... : ....

[d] The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

2 ***Choose the correct answer :***

[a] The opposite data are descriptive except ....
(the favorite colour *or* birthday *or* age *or* blood species)

[b] 75 % litre + 25 % dm^3 = ...
(10 litre *or* 1 000 cm^3 *or* 100 dm^3 *or* 100 cm^3)

[c] A cube , its volume is $\frac{1}{8}$ cm^3 , then the perimeter of one face = ... cm.
($\frac{1}{2}$ *or* 8 *or* 4 *or* 2)

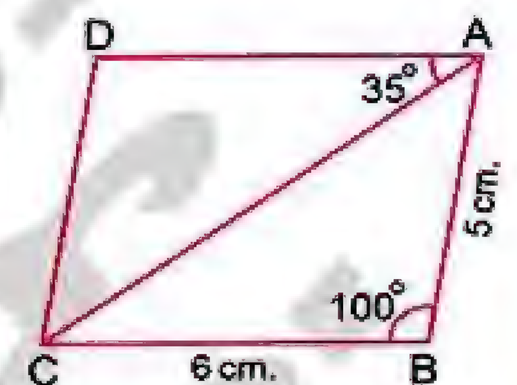
[d] 263.5 cm. ≃ .... metres (to the nearest metre)
(26 350 *or* 264 *or* 3 *or* 260)

3 [a] The ratio between the length of a rectangle to its width equals 7 : 4 , its perimeter is 44 cm. Find the length and the width of the rectangle. Then calculate its area.

[b] Aquarium in the shape of cuboid , the inner dimensions of its base are 20 cm. , 15 cm. , if 12 litres of water was poured in it.
Find the depth of the water.

4 [a] The height of a minaret is 45 metres and the length of its shadow in a moment equals 24 meters. What is the height of a tree if the length of its shadow equals 8 metres in the same moment ?

[b] ***In the opposite figure :***



ABCD is a parallelogram in which AB = 5 cm.
, BC = 6 cm. , m (∠ B) = 100° and m (∠ DAC) = 35°
Without using measuring tools , find :
(1) m (∠ D) (2) m (∠ ACD)
(3) The perimeter of parallelogram.

5 [a] The owner of a bookshop sold 25 % of notebooks and the remainder was 60 notebooks. How many notebooks were there first ?

[b] ***The following table shows the degrees of (60) students in one month in math :***

Marks	10 –	20 –	x –	40 –	Total
Number of students	10	15	25	10	60

(1) Find the value of x
(2) Draw the frequency curve for that distribution.



9 Ismailia Governorate (2017)

Answer the following questions : (Calculator is allowed)

1 *Complete the following :*

[a] The rhombus becomes a square if its diagonals are ....

[b] If the drawing length equals 5 cm. and the real length equals 30 metres , then the drawing scale is .... : .... (in the simplest form)

[c] If the lower limit of the set = 10 and the upper limit = 20 , then its centre = ...

[d] The circumference of a circle = π × ....

2 *Choose the correct answer from those between brackets :*

[a] If $\frac{x}{21} = \frac{2}{7}$, then $x - 3 =$ .... (6 or 4 or 3 or 2)

[b] The range of the set of values 4 , 7 , 3 and 9 is .... (12 or 6 or 5 or 3)

[c] The volume of a cuboid its height = 3 cm. and surface area of its base = 12 cm^2 is .... (36 cm^3 or 4 cm^3 or 36 cm^2 or 4 cm^2)

[d] The lowest common multiple of 6 and 9 is .... (3 or 6 or 9 or 18)

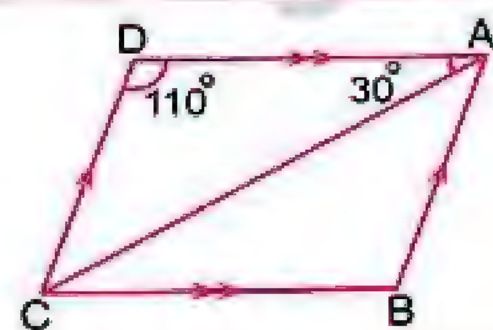
3 [a] Ahmed spends L.E. 45 in 5 days.
Calculate the rate of spending in one day.

[b] The owner of one of electrical appliances sold a refrigerator for 3 180 pounds. If the percentage of his profit is 6 %
Find the buying price of the refrigerator.

4 [a] A cube the perimeter of its base = 40 cm. Find its volume.

[b] Three persons shared in a trade. The first paid 50 000 pounds and the second paid 40 000 pounds and the third paid 30 000 pounds , at the end of the year the profit was 36 000 pounds. Find the share of each in profit.

5 [a] ***In the opposite figure :***



ABCD is a parallelogram in which m (∠ D) = 110° and m (∠ CAD) = 30° Find :

(1) m (∠ CAB) (2) m (∠ B)



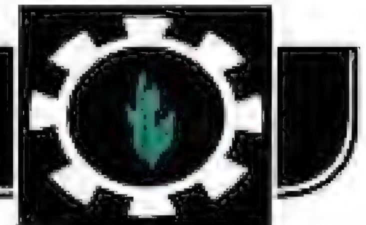
[b] *The following table shows the marks of 100 pupils in mathematics :*

Marks	10 –	20 –	30 –	40 –	50 –	Total
Number of pupils	15	35	25	15	10	100

(1) Draw the frequency curve for this distribution.

(2) Calculate the number of pupils who got less than 30 marks.

10 Suez Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 *Complete the following :*

[a] 8 hours : $\frac{1}{2}$ day = ... : .... (in the simplest form)

[b] If $\frac{2}{7} = \frac{x}{21}$, then x = ...

[c] 4 m^3 = ... dm^3

[d] The two diagonals are equal in length in each of .... and ....

2 *Choose the correct answer from those given :*

[a] 0.03 < .... (0.02 or 0.1 or 0.009 or 0.011)

[b] Ahmed bought a car at the price L.E. 60 000 and he sold it with profit 5 % , then the selling price of the car is ....

(L.E. 61 000 or L.E. 62 000 or L.E. 63 000 or L.E. 65 000)

[c] The volume of a cuboid whose dimensions are 2 cm. , 3 cm. and 5 cm. = ... (30 cm. or 30 cm^2 or 30 cm^3 or 10 cm^3)

[d] The range of the set of values 7 , 3 , 6 , 9 and 5 is ....

(9 or 3 or 6 or 7)

3 [a] An agricultural machine ploughs 6 feddans at 3 hours.
Find the rate of performance of this machine per hour.

[b] Three persons set up a commercial business , the first paid $\frac{3}{4}$ what the second paid , the second paid $\frac{2}{3}$ what the third paid , at the end of the year the profit became L.E. 6 240
Calculate the share of each of them from profit.



4 [a] The sum of lengths of all edges of a cube is 36 cm. Calculate its volume.

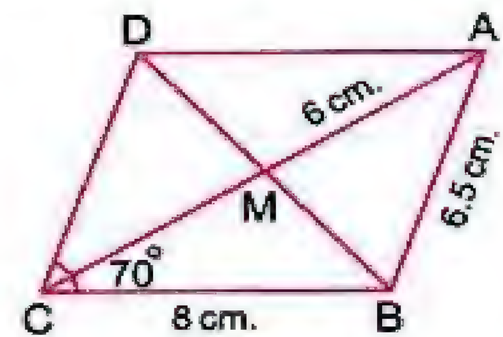
[b] ***The following table shows the marks of 100 students in one month in math :***

Marks	10 –	20 –	30 –	40 –	50 –	Total
Number of students	15	25	30	20	10	100

Draw the frequency curve for this distribution.

5 [a] If the distance between two cities is 180 km. and the drawing scale is 1 : 900 000 How long is the distance between the two cities on the map ?

[b] ***In the opposite figure :***



ABCD is a parallelogram in which AB = 6.5 cm.
, BC = 8 cm. , AM = 6 cm. , m (∠ C) = 70°
Without using geometrical instruments , find :

(1) m (∠ ABC) (2) The length $\overline{AC}$ (3) The perimeter of Δ ABC

11 Port Said Governorate (2017)



Answer the following questions :

1 ***Complete the following :***

[a] 8 765 × .... = 876.5

[b] The length of set = ... ÷ the number of sets

[c] The cube each two adjacent faces intersect at a line segment which is called ....

[d] The ratio between 18 months and 3 years = ... : .... (in the simplest form)

2 ***Choose the correct answer from those given :***

[a] 7 .... {17 , 707} (⊂ or ⊄ or ∈ or ∉)

[b] 6.7 dm^3 = ... litres (67 or 6.7 or 670 or 6 700)

[c] The opposite data are quantitative except ....
(age or height or the favorite colour or weight)

[d] If $\frac{18}{x}$ = 20 % , then x = ... (90 or 100 or 120 or 190)

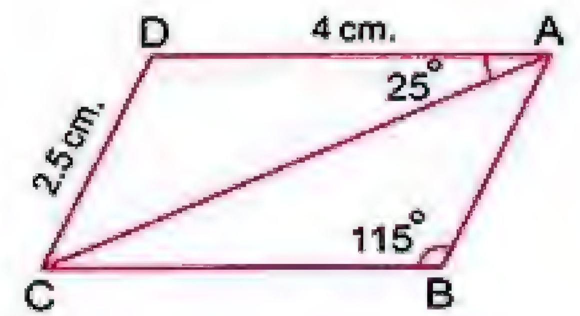


3 **[a]** A family spends L.E. 450 in 5 days.
What is the rate of what the family spends per day ?

[b] A metallic cube of edge length 18 cm. , it needs to be converted into ingots in the shape of cuboids each of them has the dimensions 3 cm. , 6 cm. and 9 cm. Calculate the number of ingots that are obtained.

4 **[a]** Find the buying price of goods sold for L.E. 17 250 and the percentage of profit is 15 %

[b] ***In the opposite figure :***



ABCD is parallelogram in which m (∠ B) = 115°
, m (∠ DAC) = 25° , AD = 4 cm. and CD = 2.5 cm.
Find : The length of $\overline{BC}$, m (∠ D) , m (∠ ACD)

5 **[a]** The distance between Port Said and Ismailia on a map of drawing scale 1 : 1 000 000 equals 9 cm. Find the real distance.

[b] ***The following table shows the degrees of 100 students in one month in math :***

Sets	10 –	20 –	30 –	40 –	50 – 60	Total
Frequency	15	25	30	20	10	100

(1) Draw the frequency curve for this distribution.

(2) What is the number of students who record less than 30 degrees ?

12 Damietta Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Complete the following :***

[a] The difference between the greatest value and the smallest value in a set of individuals is called ....

[b] The two diagonals bisects each other and equal in length in .... and ....

[c] If x , 18 , 6 and 9 are proportional , then x = ...

[d] The volume of a cube whose sum of lengths of its edges is 36 cm. equals .... cm³.

2 ***Choose the correct answer from those given :***

[a] 6 500 dm^3 = ... m^3 (65 000 or 650 or 65 or 6.5)

[b] If the drawing length is 2 cm. and the real length is 20 m. , then the drawing scale is .... (1 : 10 or 1 : 100 or 1 : 1 000 or 1 : 10 000)

[c] A rectangle of length double its width , then the ratio between width and its perimeter equals .... (1 : 6 or 1 : 3 or 1 : 2 or 2 : 1)

[d] An agricultural machine ploughs 14 feddans in 3.5 hours , then the rate of performance of the machine in feddan per one hour is .... ($\frac{1}{2}$ or 4 or 8 or 49)

3 [a] The ratio between the heights of two buildings is 4 : 7 , if the difference between their heights is 9 metres. Find the height of each building.

[b] A tank in the shape of a cuboid whose dimensions are 7 m. , 5 m. and 9 m. Find the volume of water which fill its third.

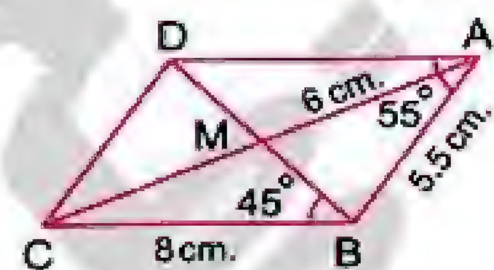
4 [a] Three persons participated in a commercial project , the first paid $\frac{3}{4}$ of what second paid and the second paid $\frac{2}{3}$ of what third paid. At the end of the year the profit was L.E. 6 240

Calculate the share of each of them.

[b] Heba bought an electric sweeping machine for L.E. 221 , if the discount was 15 %

Calculate the original price of the sweeping machine before discount.

5 [a] ***In the opposite figure :***



ABCD is a parallelogram where AB = 5.5 cm. , BC = 8 cm. , AM = 6 cm. , m (∠ BAD) = 55° , m (∠ DBC) = 45° Without measuring , find :

(1) m (∠ ABD) (2) Perimeter of Δ ACD

[b] ***On the orphan day a group of students donated amounts of money in pounds in the following table :***

Money in L.E.	3 –	5 –	7 –	9 –	11 –	Total
Number of students	7	10	15	10	8	50

(1) Represent this data by the frequency curve.

(2) What is the number of students who donated by 9 pounds and more ?

13 Kafr El-Sheikh Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 *Complete the following :*

[a] The area of triangle = ...

[b] A cube , its perimeter of the base is 36 cm. , then its volume = ... cm^3

[c] The ratio between 0.75 kirat : 16 sahms = ... : .... in the simplest form

[d] If {3 , 6} = {9 – x , 3} , then x = ...

2 *Choose the correct answer from those given :*

[a] The range of the set of values 7 , 3 , 6 , 9 , 5 equals ....
(3 *or* 4 *or* 6 *or* 17)

[b] The length of an insect in the picture is 4 cm. and its real length is 2 millimetres , then the drawing scale is ....
(1 : 20 *or* 1 : 80 *or* 20 : 1 *or* 80 : 1)

[c] 4.6 liter = ... mL. (46 *or* 460 *or* 4 600 *or* 46 000)

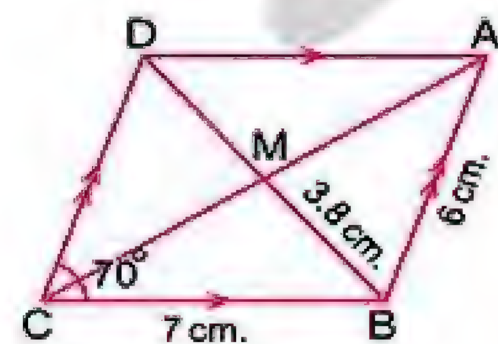
[d] The opposite data are descriptive except ....
(the favorite colour *or* the birth place *or* the age *or* the blood species)

3 [a] If the ratio between dimensions of rectangle is 3 : 4 and its perimeter equals 140 cm. , find its area.

[b] Find the cost price of goods sold for 21 275 pounds , with profit percentage 15 % and find the value of the profit.

4 [a] A piece of building land is distributed between two brothers in the ratio 7 : 5 , if the share of the first one exceeds the share of the second by 80 square metre. Find the area of the land.

[b] ***In the opposite figure :***



ABCD is a parallelogram in which AB = 6 cm. , BC = 7 cm. , BM = 3.8 cm. and m (∠ C) = 70° , without using geometrical instruments find :

(1) m (∠ ADC) (2) The perimeter of Δ BCD

5 [a] A swimming pool , its internal dimensions are 30 , 15 and 2 metres , if 405 m^3 of water are poured into it

Find the height of water in the swimming pool in centimetres.

[b] ***The following table shows the degrees of 100 students in one month in maths :***

Marks	20 –	30 –	40 –	50 –	**Sum**
Number of students	15	30	40	15	**100**

(1) Draw the frequency curve for this distribution.

(2) ***Complete :*** The ordered pair which represent the set 50 – is ....

14 El-Beheira Governorate (2017)



Answer the following questions :

1 ***Choose the correct answer :***

[a] The centimetre cube is a unit for measuring ....

(the perimeter *or* the area *or* the volume *or* the length)

[b] If the ratio among the measurements of the angles of a triangle is 1 : 2 : 3 , then the measure for the smallest angle equals ....

(10° *or* 30° *or* 45° *or* 60°)

[c] The diagonals are perpendicular in each of ....

(square and rectangle *or* rhombus and rectangle *or* square and rhombus *or* parallelogram and rectangle)

[d] .... is quantitative data. (The favourite colour *or* The birth place *or* The blood species *or* The age)

2 ***Complete the following statements :***

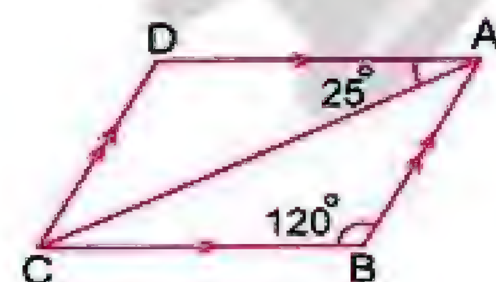
[a] $62.5\ \% = \frac{\cdots\cdots}{8}$

[b] 3 litres = ... cm^3

[c] **In the opposite figure :**

ABCD is a parallelogram

, m (∠ BAC) = ... °



[d] If the marks of 5 pupils in one in the tests are 29 , 33 , 57 , 40 , 36 , then the range for these marks is equal to ....



3 **[a]** Two machines for the manufacture of cloth. The first produces 500 metres of cloth in two hours and the second produces 600 metres of cloth in $2\frac{1}{2}$ hours. Which of the two machines is more efficient ?

(Determine the steps of solution)

[b] Atlas of a number of cities drawn at a scale of 1 : 100 000 , if the real distance between the two cities is 36 km. , find the drawing distance between them in this atlas.

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4 **[a]** A man died and left a piece of land for building , its area is 17 kirats. He recommended for building on orphan house on area equals 5 kirats. The remainder is distributed between his son and his daughter in the ratio 2 : 1 Calculate the share of each of them from the land.

[b] A swimming pool in the shape of a cuboid whose internal dimensions are 40 m. , 30 m. and 1.8 m. Find its capacity in litres.

---

5 **[a]** A glass vessel is cubed-shaped , its inner edge length is 30 cm. This vessel contains an amount of water. If we throw a metallic piece in it , then the water level raised 5 cm. because of that. Find the volume of the metallic piece.

[b] ***The following frequency distribution table represents the daily wages of a sample formed from 50 workers in a factory :***

Wages	10 –	20 –	30 –	40 –	50 –	60 –	70 – 80	Total
Number of workers	4	6	10	14	8	5	3	50

(1) Draw the frequency curve.

(2) Find the percentage of the number of workers whose wages are less than L.E. 40

15 El-Fayoum Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Complete each of the following :***

[a] The ratio between 18 kirats : $\frac{1}{2}$ feddan = ... : ....

(in the simplest form)

[b] The sum of measures of the interior angles of a triangle = ...°

[c] A vase in the shape of a cube the length of its interior edge equals 20 cm. , then its capacity = ... litres.



[d] If the values of a frequency distribution lie between (20 , 60) , then the range of this distribution = ...

2 ***Choose the correct answer from those between brackets :***

[a] If $\frac{5}{9} = \frac{15}{x}$, then x = ... (3 or 5 or 15 or 27)

[b] {3 , 5} ∩ {4 , 5} = ... ({3} or {5} or {4} or {3 , 4 , 5})

[c] The opposite data are quantitive data except ....
(the length or the age or the birth place or the weight)

[d] If the volume of the cuboid equals 400 cm^3 and the area of its base equals 50 cm^2 , then its height = ... cm.
(8 or 80 or 40 or 50)

3 [a] A map is drawn with a scale 1 : 200 000 , if the distance between two cities on this map is 8 cm. Find the real distance between the two cities in kilometers.

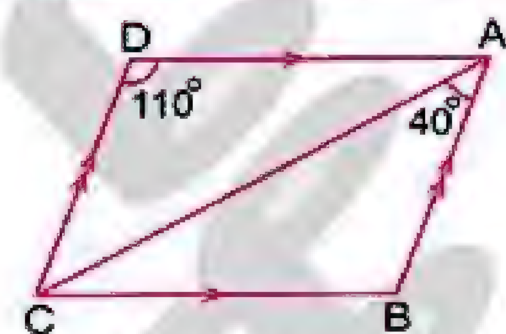
[b] Osama bought a car in the price L.E. 60 000 and he sold it with profit 5 %
Find the selling price of the car

4 [a] If the ratio between the share of Hany and the share of Sherif and the share of Khalid is 3 : 5 : 7 and if the share of Hany is L.E. 24
Calculate the share of each of Sherif and Khalid.

[b] A cube of metal its edge length equals 12 cm. need to be melted down and converted into alloys in the form of a cuboid with dimensions 3 cm. , 4 cm. and 6 cm. Calculate the number of alloys that can be obtained.

5 [a] ***In the opposite figure :***

ABCD is a parallelogram in which
m (∠ D) = 110° , m (∠ BAC) = 40°
Find : m (∠ B) , m (∠ DAC)



[b] ***The following table shows the marks of 50 pupils in mathematics exam :***

The marks	15 –	20 –	25 –	30 –	35 –	Total
No. of pupils	8	12	14	10	6	50

Draw the frequency curve for this distribution.

16 Beni Suef Governorate (2017)



Answer the following questions :

1 *Complete the following :*

[a] The area of a rectangle = ... × ....

[b] If $\frac{3}{4} = \frac{x}{12}$, then x = ...

[c] 5 + 5 + 5 + 5 = 5 × .... = ...

[d] If the values of a frequency distribution lie between (90 , 30) , then the range of this distribution = ...

2 *Choose the correct answer from those given between brackets :*

[a] The sum of the measures of any two consecutive angles in a parallelogram = ...° (90 or 360 or 180 or 108)

[b] The side length of a square = 4 cm. , then the ratio between its side length and its perimeter = ... (4 : 1 or 1 : 3 or 3 : 1 or 1 : 4)

[c] A cuboid its volume is 400 cm^3 , its length is 8 cm. and its width is 5 cm. , then its height = ... cm. (8 or 5 or 10 or 4)

[d] The opposite data are descriptive except ....
(the favourite colour or the birth place or the age or the blood type)

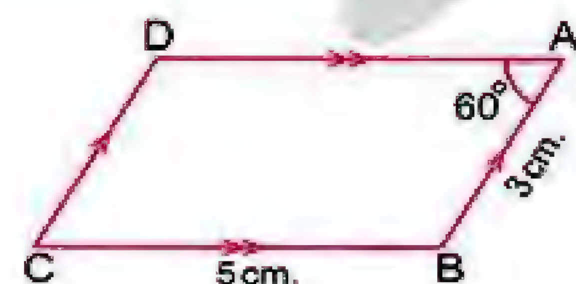
3 [a] A factory produces 1 000 juice cans in 4 hours , calculate its production rate per hour.

[b] A man deposit L.E. 9 000 in a bank and the percentage of interest 10% per year. What is the amount of this sum after one year ?

4 [a] The sum of edges length of a cube is 36 cm. Find volume of this cube.

[b] Atlas of a number of cities drawn at a scale of 1 : 200 000 , if the real distance between the two cities is 48 km. Find the distance between them in this atlas.

5 [a] ***In the opposite figure :***



ABCD is a parallelogram in which AB = 3 cm. , BC = 5 cm. and m (∠ A) = 60° Find :

(1) m (∠ C)

(2) The perimeter of parallelogram ABCD

[b] ***The following table shows the marks of 100 pupils in maths :***

The sets	10 –	20 –	30 –	40 –	Sum
The frequency	25	30	25	20	100

Draw the frequency curve for this data.

17 El-Menia Governorate (2017)



Answer the following questions :

1 ***Choose the correct answer from those given :***

[a] 500 gm. : $1\frac{1}{2}$ kg. = ... : .... (1 : 6 *or* 1 : 5 *or* 1 : 4 *or* 1 : 3)

[b] If the sum of the edges length of a cube equals 24 cm. , then its volume = ... cm^3. (8 *or* 12 *or* 64 *or* 128)

[c] 2.7 ÷ 0.09 = ... (3 *or* 30 *or* 0.3 *or* 0.03)

[d] Which of the following data is countable ?
(the favorite colour *or* the place of birth *or* the age *or* the blood species)

2 ***Complete the following :***

[a] The two diagonals are perpendicular in each of .... and ....

[b] Three tenths of a number = ... %

[c] The range of the set of values : 5 , 7 , 3 , 9 , 11 = ...

[d] 6.284 × 10 = ...

3 **[a]** If the ratio between the dimensions of rectangle is 3 : 4 and its perimeter equals 70 cm. Find its area.

[b] Ahmed draws a picture to his brother Osama with a drawing scale 1 : 40 , if the real height of Osama is 160 cm.
What is his height in the picture ?

4 **[a]** If the cost price of a set of electric appliances is 60 000 pounds and it is sold at 12% profit. Calculate the selling price.

[b] A cube of cheese its edge length is 15 cm. it needs to be divided it into small cubes the edge length of each is 3 cm. for presenting them through meals. Calculate the number of resulting small cubes.

5 **[a]** A juice case in the shape of cuboid , its base is square-shaped of side length 6 cm. and its height is 15 cm. Calculate the volume of juice which fills the case completely.

[b] ***On the orphan day a group of students denoted amounts of money in pounds shown in the following table :***

Money in pounds	3 –	5 –	7 –	9 –	11 –	Sum
Number of students	7	10	15	10	8	50

(1) What is the number of students who denoted by 7 pounds and more ?

(2) Draw the frequency curve for this distribution.

18 Assiut Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Choose the correct answer from those given :***

[a] If $\frac{7}{13} = \frac{x}{52}$, then x = ... (14 or 21 or 28 or 25)

[b] 39 days ≃ .... weeks. (5 or 6 or 7 or 8)

[c] The opposite data are descriptive except ....
(the favorite colour or the birthday or the age or the blood species)

[d] 18 kirats : 2 feddans = ... (in the simplest form).
(3 : 4 or 4 : 3 or 9 : 2 or 3 : 8)

2 ***Complete the following :***

[a] $2\frac{3}{4} \div 1\frac{3}{8}$ = ...

[b] If one of the angles of the parallelogram is right and two of its adjacent sides are equal in length , then it is called ....

[c] An agricultural machine ploughs 14 feddans in 3.5 hours. , then the rate of performance of the machine in feddan per hour is ....

[d] The range of the set of values 7 , 3 , 6 , 9 is ....

3 **[a]** Two wire pieces , the ratio between their length is 5 : 9 , if the sum of their lengths is 126 metres. Calculate the length of each piece.

[b] A picture was take to an artificial scene with a drawing scale 1 : 100
If the real length of a tree is 18 metres , find its length in the picture.



4 [a] A swimming pool , its internal dimensions are 30 , 15 and 2 metres. 405 m^3 of water are poured into it. Find :

(1) The height of water in the swimming pool.

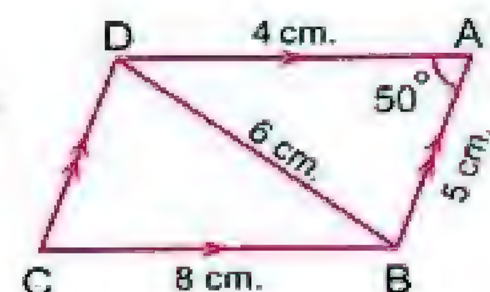
(2) The volume of water which is needed to fill the swimming pool completely.

[b] ***In the opposite figure :***

ABCD is a parallelogram in which

AB = 5 cm. , BC = 8 cm. , BD = 6 cm. , m (∠ A) = 50°

Without using geometrical instruments , find :



(1) m (∠ ADC) (2) The perimeter of Δ BCD

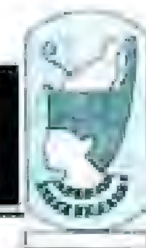
5 [a] A piece of building land is distributed between brothers in the ratio 7 : 5 If the share of the first one exceeds the share of the second by 80 square meter. Find the area of the land and the share of each of the first and the second.

[b] ***The following table shows the age of visitors to an exhibition within an hour of the day :***

Visitor's age	10 –	20 –	30 –	40 –	50 –	The sum
Number of visitors	6	9	12	10	8	45

Draw the frequency curve for this distribution.

19 Souhag Governorate (2017)



Answer the following questions :

1 ***Complete the following :***

[a] The two diagonals are equal in length in each of ………… and …………

[b] The ratio between 250 gm. : $\frac{3}{4}$ kg. = ………… : …………

[c] If the numbers 4 , x , 12 and 18 are proportional then x = …………

[d] If the values of a frequency distribution lie between 20 , 60 , then the range of this distribution = …………

2 ***Choose the correct answer :***

[a] The circumference of circle = ………… ($2\pi r$ or πr^2 or πr or $3r$)

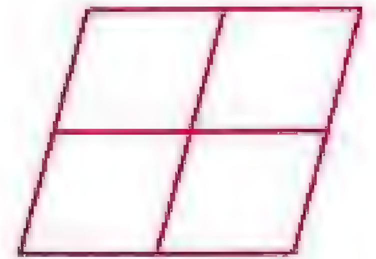
[b] The opposite data are descriptive except …………

(the favourite colour or the birth place or the blood species or the age)

[c] The side length of a square is 3 cm. , then the ratio between its length and its perimeter equals .... (4 or 3 or $\frac{1}{4}$ or $\frac{1}{3}$)

[d] **In the opposite figure :**

The number of parallelograms which can be obtained is .... (4 or 5 or 7 or 9)



3 [a] If the drawing scale which is registered on a map is 1 : 500 000 and the distance between two cities on this map is 3 cm. Find the real distance between them in kilometres.

[b] Hany , Samy and Khaled started a trade business. Hany paid 30 000 pounds. Samy paid 40 000 pounds and Khaled paid 50 000 pounds. At the end of the year the profit of the company was 6 000 pounds. Find the share of each of them from the profit.

4 [a] A cube of metal its edge length equals 9 cm. need to be melted down and converted into alloys in the form of cuboid with dimensions 3 cm. , 3 cm. and 1 cm. Calculate the number of alloys that can be obtained.

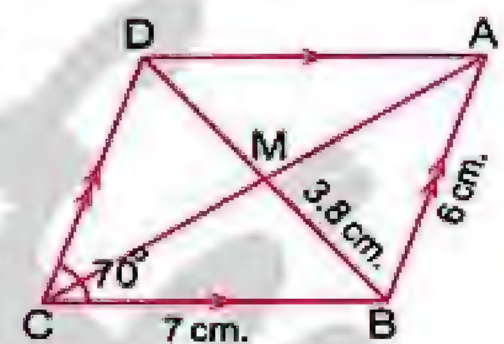
[b] Find the buying price of goods sold for 23 000 pounds with profit percentage 15% and find the profit.

5 [a] ***In the opposite figure :***

ABCD is a parallelogram in which AB = 6 cm. , BC = 7 cm. , MB = 3.8 cm. and m (∠ C) = 70°

Without using measuring tools , calculate :

(1) m (∠ ADC) (2) The perimeter of Δ BCD



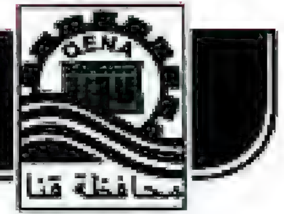
[b] ***The following table shows the ages of visitors to an exhibition within an hour of the day :***

Visitor's age	10 –	20 –	30 –	40 –	50 –	Total
Number of visitors	6	9	12	10	8	45

(1) What is the number of visitors whose ages are less than 40 years ?

(2) Draw the frequency curve for this distribution.





20 Qena Governorate (2017)

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer :

[a] The following data are quantitative except ....
(the age or the blood species or the number of children or the weight)

[b] If an angle in a parallelogram is right and two adjacent sides are equal in length , then it is called ....
(rhombus or triangle or square or rectangle)

[c] If the values of a frequency distribution lie between 20 and 60 , then the range of this distribution is .... (40 or 80 or 60 or 100)

[d] 4.6 litres = ... mL. (46 or 460 or 46 000 or 4 600)

2 Complete the following :

[a] If $\frac{2}{7} = \frac{x}{21}$, then x = ...

[b] The ratio between the side length of a square and its perimeter = ... : ....

[c] $\frac{9}{20}$ = ...%

[d] If the base of a cuboid is on the shape of a square of side length 10 cm. and its height of 7 cm. , then its volume = ...

3 [a] A tractor ploughs 6 feddans in three hours , if another tractor ploughed 10 feddans in 4 hours , which of them is more efficiency.

[b] A cube-shaped vessel is full of oil , its inner edge is 30 cm.

(1) Calculate its capacity in litres.

(2) Calculate the price of oil if the price of one litre = 10 pounds.

4 [a] A picture was taken to a building with a drawing scale 1 : 1 000 , if the height of that building in the picture is 3 cm. , then find its real length.

[b] A metallic cube its edge length is 12 cm. is melted and converted into ingots in the shape of cuboids each of them has the dimensions 3 cm. , 4 cm. and 6 cm. Find the number of ingots that are obtained.



5 [a] A piece of building land is distributed between two brothers in the ratio 7 : 5 , if the share of the first one exceeds the share of the second by 80 square metres , find the area of the land and the share of each of them.

[b] ***The following table shows the marks of 100 pupils in a month :***

Marks	20 –	30 –	40 –	50 –	Total
Number of pupils	15	30	40	15	**100**

(1) How many pupils get less than 40 degrees ?

(2) Draw the frequency distribution.

21 Luxor Governorate (2017)



Answer the following questions :

1 ***Choose the correct answer :***

[a] If the numbers 4 , x , 12 , 18 are proportional quantities , then x = ... (3 or 6 or 9 or 12)

[b] The measure of the straight angle = ...° (90 or 180 or 360 or 120)

[c] The range of the values 1 , 3 , 4.4 , 5 is .... (1 or 3 or 4 or 5)

[d] A cube of volume 125 cm^3 , its base area = ... (25 cm^2 or 25 cm or 5 cm^2 or 5 cm)

2 ***Complete the following :***

[a] 16 kirats : 1 feddan = ...

[b] The following data (age , length , weight , blood type) are quantitative except ....

[c] 3 litres = ... cm^3

[d] The four sides are equal in length in .... and ....

3 [a] Ahmed bought a flat for L.E. 150 000 and sold it with loss 5 % Find the selling price of the flat.

[b] If the drawing scale of a picture of one building is 1 : 1 000 and if the height of the building in the picture is 3 cm. , find the real height in metres.



4 [a] If the ratio between the length of two roads is 2 : 5 and the difference between their lengths is 21 km. , find the length of each road.

[b] A container in the shape of a cube its inner edge length is 20 cm. , full of honey. If the price of each litre of honey is 8 pounds , find the price of the honey in container.

5 [a] A cartoon box in the shape of a cuboid , its inner dimensions are 50 cm. , 40 cm. and 30 cm. it is wanted to fill it with tea boxes each in the shape of a cuboid of dimensions 10 cm. , 5 cm. and 6 cm. , calculate the number of tea boxes which fill completely the cartoon box.

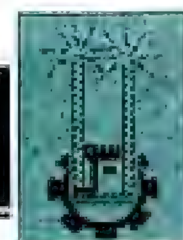
[b] ***The following table represents the marks of 100 students in math's test :***

Marks	20 –	30 –	40 –	50 –	Total
Number of students	15	30	40	15	100

(1) Represent these data by the frequency curve.

(2) What is the number of students who got less than 40 marks ?

22 Aswan Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Choose the correct answer :***

[a] $\frac{1}{2}$ = ... (0.5 or 0.2 or 0.1 or 0.05)

[b] 300 gm. : 1 $\frac{1}{2}$ kg. = ... (1 : 3 or 1 : 5 or 1 : 10 or 1 : 30)

[c] If one the angles of parallelogram is right and two adjacent sides are equals in length is called ....

(rhombus or rectangle or triangle or square)

[d] The opposite data are quantitative except the ....

(age or tallness or favourite colour or weight)

2 ***Complete the following :***

[a] 5 cm^3 = ... mL.

[b] 48.684 ≃ .... (to nearest hundredth)

[c] If the values of a frequency distribution lie between (20 , 60) , then the range = ...

[d] If $\frac{x}{3}$ = 9 % , then x = ...

3 [a] The price of buying refrigerator is L.E. 2 400 and price of selling is L.E 2 640 Calculate the percentage of profit.

[b] If the distance between two cities on map is 10 cm. and the real distance between them is 120 km. Find the drawing scale of this map.

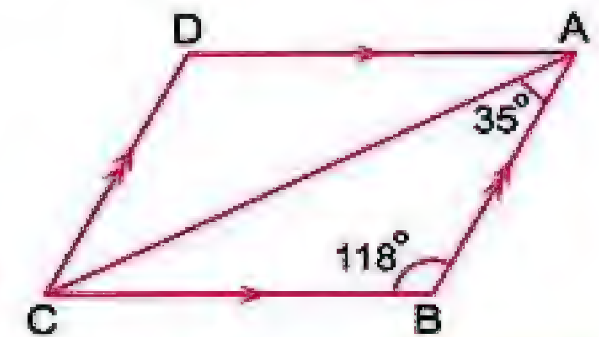
4 [a] A case in the shape of a cuboid , its base is a square-shaped of side length 6 cm. and its height is 10 cm. Calculate its volume.

[b] *In the opposite figure :*

ABCD is parallelogram where

m (∠ B) = 118° , m (∠ BAC) = 35°

Find : m (∠ D) , m (∠ DAC)



5 [a] If the ratio between the measures angles of triangle is 5 : 6 : 7 and the measure of the smallest angle is 50°
Find the measure of each of the other two angles.

[b] ***The following table shows the marks of 100 pupils in math exam :***

Marks	10 –	20 –	30 –	40 –	50 –	Total
Number of pupils	15	25	30	20	10	100

(1) Calculate the number of pupils who got 30 marks or more.

(2) Draw the frequency curve for this distribution.

23 South Sinai Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 ***Complete the following :***

[a] 18 kirats : 2 feddans = ... : .... (in the simplest form)

[b] In the quadrilaterals , the two diagonals are equal in length in each of .... and ....

[c] The difference between the greatest and the smallest value in set of individuals is called ....

[d] The smallest prime number is ....

2 ***Choose the correct answer from those given answers :***

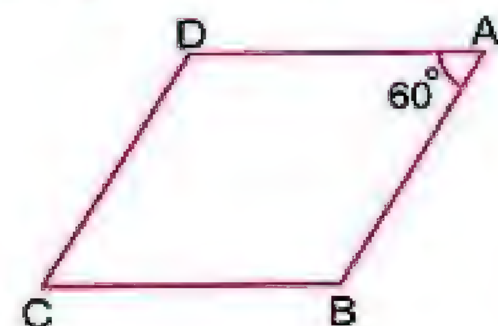
[a] If $\frac{2}{7} = \frac{x}{21}$, then $x =$ .... (6 *or* 7 *or* 12 *or* 21)

[b] The opposite data are descriptive except ....

(the favorite colour *or* the birth place *or* the age *or* the blood species)

[c] Number of edges of a cuboid = ... edges. (4 *or* 6 *or* 8 *or* 12)

[d] **In the opposite figure :**



ABCD is a parallelogram

, m (∠ A) = 60°

, then m (∠ B) = ...

(30° *or* 60° *or* 90° *or* 120°)

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3 [a] A cubic vessel of internal edge length 30 cm.

Calculate the capacity of the vessel in litres.

[b] If the distance between two cities is 180 km. and the drawing scale is 1 : 9 000 000

How long is the distance between the two cities on the map ?

---

4 [a] A shop keeper for electric sets sold a refrigerator for L.E. 3 180

If the percentage of his profit is 6 % Find the buying price.

[b] A primary school has 540 pupils if the ratio between the number of boys to the number of girls is 4 : 5 Calculate the number of each boys and girls.

---

5 [a] Find the volume of a cuboid in which the area of its base is 16 cm^2 and of height 9 cm.

[b] ***The following table shows the degree of 100 students in one month in math :***

Marks	10 –	20 –	30 –	40 –	Total
Number of students	15	25	45	15	100

Draw the frequency curve for this distribution.

24 Red Sea Governorate (2017)



Answer the following questions :

1 *Choose the correct answer :*

[a] 42 000 cm^2 = ... m^2 (42 or 420 or 4.2 or 4 200)

[b] If the numbers 4 , x , 12 , 18 were in proportion , then the value of x = ... (6 or 9 or 15 or 18)

[c] If the sum of the edge lengths of a cube equals 60 cm. , then its volume equals .... cm^3 (1 000 or 343 or 216 or 125)

[d] The following data are descriptive except .... (the place of birth or the blood species or the age or the favorite colure)

2 *Complete the following :*

[a] The two diagonals are perpendicular in each of .... , ...

[b] If the values of a frequency distribution lie between (30 , 50) , then the range of this distribution = ...

[c] A factory produce 8 000 bottles of soft drink in 16 hour , then the rate of production per hour = ... bottle/hour

[d] 45 days ≃ .... to the nearest week.

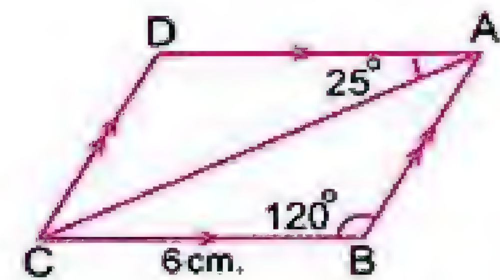
3 [a] Two lorries , the load of the first is 600 kg. and the load of other is 1.5 ton , find the ratio between the load of the first to the load of the second in the simplest from. (ton = 1 000 kg.)

[b] If the length of the Suez Canal on a map of drawing scale 1 : 1 100 000 is 15 cm. Find its real length in kilometres.

4 [a] A company for selling the electric sets it shows TV set for L.E 2 200 If the percentage of the profit is 10 % Find the buying price of TV set

[b] A cuboid of volume is 4 800 cm^3 and the area of its base is 240 cm^2 Find its height.

5 [a] The opposite figure shows a parallelogram in which m (∠ B) = 120°, m (∠ DAC) = 25° and BC = 6 cm.



Calculate without using measuring tools each of :

(1) m (∠ D)

(2) m (∠ BAC)

(3) The length of $\overline{AD}$



[b] *The following table shows the age of visitors to an exhibition within an hour of the day :*

Visitor's age	10 –	20 –	30 –	40 –	50 –	Sum
Number of visitors	6	9	12	10	8	45

Draw the frequency curve for this distribution.

25 Matrouh Governorate (2017)



Answer the following questions : (Calculator is allowed)

1 *Complete the following :*

[a] The volume of the cube = ...

[b] $1\frac{3}{4}$ = ... %

[c] $\frac{1}{4} + \frac{3}{4}$ = ...

[d] The difference between the greatest value and the smallest value in a set of individuals is called ....

2 *Choose the correct answer :*

[a] If $\frac{2}{7} = \frac{x}{21}$, then x = ... (6 or 21 or 12 or 7)

[b] 3 .... {1 , 2 , 3 , 4} (⊂ or ⊄ or ∈ or ∉)

[c] In the parallelogram , the sum of the measures of any two consecutive angles = ... (160° or 280° or 180° or 120°)

[d] The opposite data are descriptive except ....
(the favorite colour or the birthday or the age or the blood species)

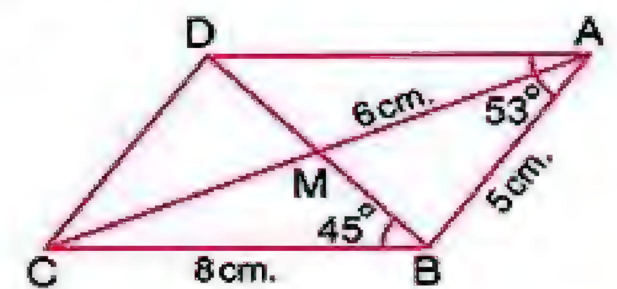


3 [a] The ratio between the lengths of two roads is 2 : 5 and the difference between their lengths is 21 km. Find the length of each road.

[b] Find the buying price of goods sold for L.E. 41 400 and the percentage of profit is 15% and find the profit.

4 [a] A container has 12 litres of honey , it is wanted to put them in smaller vessels (bottles) the capacity of each of them is 400 cm^3.
Calculate the number of bottles which is needed for that.

[b] ***In the opposite figure :***



m (∠ A) = 53° , m (∠ DBC) = 45°
, AM = 6 cm. , AB = 5 cm. , BC = 8 cm.
Calculate without using measuring tools each of :

(1) m (∠ ABD)

(2) m (∠ D)

(3) The length of $\overline{AC}$

5 [a] A macket of a playground of a school is drawn is drawn with drawing scale 1 : 500 the dimensions of the playground in the picture were 2 cm. and 4 cm. Find the real dimensions of the playground in metre.

[b] ***The following table shows the number of hours which the pupils of a class spend daily in front of the computer :***

Number of hours	1 –	2 –	3 –	4 –	5 –	6 –	Total
Number of pupils	7	11	15	6	4	2	45

Represent these data by frequency curve.

Some Governorates Examinations for the Year 2016



1 Cairo Governorate (2016)

Answer the following questions : (Calculator is allowed)

1 *Complete the following :*

[a] 0.4 : 0.8 = ... : .... (in the simplest form)

[b] The range of set of the these values : 20 , 95 , 70 and 45 equals ....

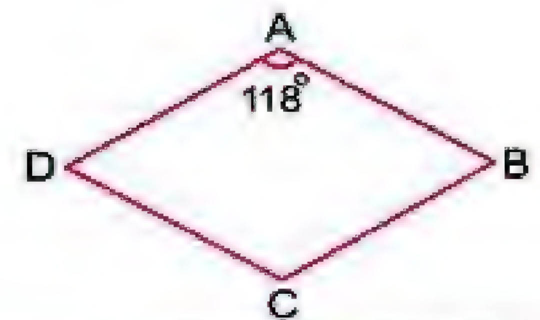
[c] If the quantities : x , 6 , 20 and 30 are in proportion , then x = ...

[d] **In the opposite figure :**

ABCD is a rhombus in which

m (∠ A) = 118°

, then m (∠ B) = ...°



2 *Choose the correct answer from those given :*

[a] The cuboid has .... edges. (12 or 8 or 6 or 4)

[b] The given data are quantitative except the ....

(weight or length or nationality or age)

[c] 1.2 litres + 800 cm^3 = ... litres. (2 or 9.2 or 200 or 2 000)

[d] If 100 grams of chocolate give 300 calories. What is the number of calories which are found in 30 grams of the same chocolate ?

(90 or 100 or 900 or 9 000)

3 [a] If the length of Suez Canal in a map of drawing scale 1 : 1 100 000 is 15 cm. , then find its real length in kilometres.

[b] Three persons involved in a business , the first paid L.E. 60 000 , the second paid L.E. 80 000 and the third paid L.E. 90 000
At the end of the year the profit was L.E. 20 700
Find the share of each person in profit.

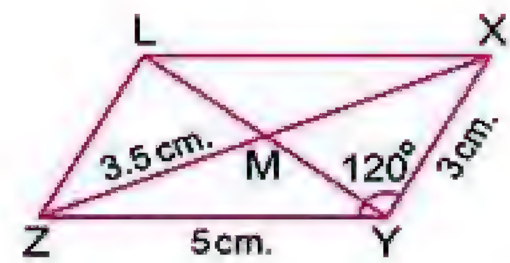
4 [a] A man bought a flat for L.E. 100 000 , after three years he sold it for L.E. 130 000 Find the percentage of his profit.

[b] *In the opposite figure :*

XYZL is a parallelogram in which m (∠ XYZ) = 120° , XY = 3 cm. , YZ = 5 cm. and ZM = 3.5 cm.

Find : **(1)** m (∠ XLZ)

(2) The perimeter of the triangle XLZ



5 **[a]** A container contains 12 litres of honey. It is wanted to pour it in small bottles , the capacity of each of them is 400 cm^3.
Calculate the number of bottles which are needed for that.

[b] *The following table shows the marks of 100 pupils in mathematics in a month :*

The marks	20 –	30 –	40 –	50 – 60	Total
Number of pupils	10	30	40	20	100

Draw the frequency polygon for this distribution.

2 Giza Governorate (2016)



Answer the following questions : (Calculator is allowed)

1 ***Complete the following :***

[a] If $\frac{x}{27} = \frac{2}{3}$, then x = ...

[b] The volume of a cube of edge length 3 cm. = ... cm^3.

[c] The ratio between the side length of a square and its perimeter = ... : ....

[d] The range of the set of the values : 7 , 3 , 6 , 9 and 5 is ....

2 ***Choose the correct answer :***

[a] $\frac{3}{4}$ litre = ... cm^3. (250 *or* 500 *or* 750 *or* 900)

[b] 20 % from 40 kg. = ... kg. (4 *or* 8 *or* 12 *or* 16)

[c] The opposite data are descriptive except the ....
(favorite colour *or* birth place *or* age *or* blood species)

[d] If one angle in a parallelogram is right , then it is called ....
(rhombus *or* trapezium *or* triangle *or* rectangle)



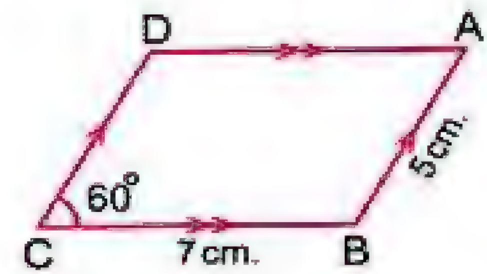
3 [a] Find the volume of a cuboid with dimensions 12 cm. , 10 cm. , 8 cm.

[b] Find the buying price of goods sold for L.E. 21 520 and the percentage of profit is 15 % , and find the profit.

4 [a] Omar took a magnified picture with a camera. If the length of an insect in the picture is 10 cm. and its real length is 2 mm. Find the drawing scale.

[b] A load of apple fruit weights 280 kg. is distributed among three merchants. The share of the first = $\frac{2}{3}$ the share of the second and the share of the second = $\frac{4}{5}$ the share of the third.
Calculate the share of each of them from this load.

5 [a] ***In the opposite figure :***



ABCD is a parallelogram in which
, AB = 5 cm. , BC = 7 cm.
, m (∠ C) = 60° Find :

(1) m (∠ A) (2) m (∠ D)

(3) The perimeter of the parallelogram ABCD

[b] ***The following table shows the degrees of 100 students in maths test :***

Marks	20 –	30 –	40 –	50 –	Sum
Number of students	15	20	50	15	100

Represent these data by the frequency curve.

3 Alexandria Governorate (2016)



Answer the following questions :

1 ***Complete the following :***

[a] 12 × (350 + ...) = ... × 350 + 12 × 220

[b] If the length of an insect in the picture is 10 cm. and its real length is 2 mm. , then the drawing scale = ... : 1

[c] 4.63 litre = ... cm^3.

[d] $\frac{\text{The range}}{\text{The length of the set}}$ = ...

2 ***Choose the correct answer from those given :***

[a] If $\{3, 5\} \subset \{3, 7, x\}$, then x = ... (5 *or* 9 *or* 6 *or* 15)

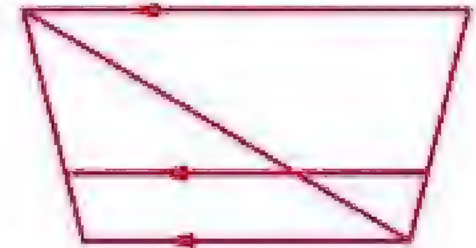
[b] The following data are quantitative except ....

(age *or* weight *or* the favourite colour *or* tallness)

[c] If a : b = 2 : 3 , b : c = 3 : 5 , then a : c = ...

(8 : 15 *or* 2 : 5 *or* 4 : 9 *or* 3 : 10)

[d] **In the opposite figure :**



The number of trapezoids is ....

(3 *or* 4 *or* 2 *or* 5)

3 [a] The ratio between the length of a rectangle to its width equals 7 : 4 , its perimeter is 44 metres. Find the length and the width of the rectangle and calculate its area.

[b] A tank in the shape of a cuboid of dimensions 7 m. , 5 m. and 9 m. What is the volume of water which fills its third ?

4 [a] Two machines for the manufacture of cloth , the first produces 500 metres of cloth in two hours and the second produces 600 metres of cloth in 2 hours and half.

Which of the two machines is more efficient ?

[b] A company for electrical appliances displays the TV set for 1 026 pounds. If the company sold it with profit percentage is 14 % Find the buying price for the TV set.

5 [a] A cube of clay of edge length 8 cm. Cubes of edge length of each = 2 cm. are made of it. Find the number of these cubes.

[b] ***The following table shows the age of visitors to an exhibition within an hour of the day :***

Visitor's age	10 –	20 –	30 –	40 –	50 –	Total
Number of visitors	6	9	12	10	8	45

(1) What is the number of visitors whose ages are less than 40 years ?

(2) Draw the frequency curve for this distribution.



4 El-Kalyoubia Governorate (2016)

Answer the following questions :

1 *Complete the following :*

[a] The ratio between 18 kirats and $1\frac{1}{2}$ feddans = ... : ....

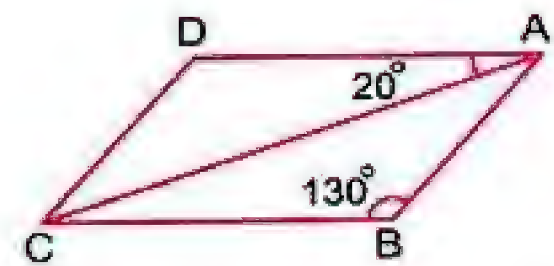
[b] If the marks of 4 pupils in a maths test are 22 , 39 , 62 , 54 , then the range of the marks = ...

[c] If 2 , x , 8 , 20 are proportional , then x = ...

[d] The drawing scale = ...

2 *Choose the correct answer :*

[a] **In the opposite figure :**



ABCD is parallelogram , then m (∠ BAC) = ...

(50° or 20° or 30° or 120°)

[b] $\frac{3}{4}$ litre = ... (75 mL. or 7.5 dm^3 or 750 cm^3 or 0.075 cm^3)

[c] 0.12 = ... % (1.2 or 12 or 0.12 or 120)

[d] From the quantitative data is the ....

(favorite colour or birth place or blood type or age)

3 [a] A car covers 240 km. in three hours. Find the rate of the speed of the car.

[b] If a man deposited L.E. 20 000 in a bank with an annual interest 8 %

Find the total amount he gets at the end of one year.

4 [a] A magnified picture of an insect was taken with a drawing scale 200 : 1 , if its real length is 1.2 mm. find its length in the picture.

[b] A box in the shape of a cuboid with dimensions 30 cm. , 25 cm. and 15 cm. , if it is filled with cuboid shaped pieces of sweets of dimensions 6 cm. , 5 cm. , 3 cm. Find the number of pieces of sweets.

5 [a] The ratio between the lengths of the sides of a triangle is 2 : 3 : 4 , if the perimeter of the triangle is 108 cm.

Find the length of each side of the triangle.



[b] *The following table shows the marks of 100 pupils in a maths exam :*

The sets	10 –	20 –	30 –	40 –	50 – 60	Total
The frequency	15	25	30	20	10	100

Represent the previous data by the frequency curve.

5 El-Sharkia Governorate (2016)



Answer the following questions :

1 ***Choose the correct answer :***

[a] $1 - (35\ \% + 25\ \%) =$ .... ($\frac{1}{2}$ or $\frac{1}{3}$ or $\frac{2}{5}$ or $\frac{3}{4}$)

[b] $2\ m^3 =$ .... dm^3 (2 or 20 or 200 or 2 000)

[c] **In the opposite figure :**

The number of parallelograms is ....



(9 or 7 or 5 or 4)

[d] The opposite data are descriptive except ....

(blood species or the weight or the birth place or the social case)

2 ***Complete the following :***

[a] The ratio between 2 kilograms and 1 500 grams in the simplest form is .... : ....

[b] If $\frac{x}{3} = 9\ \%$, then $x =$ ....

[c] In a parallelogram , the sum of the measures of any two consecutive angles = ...

[d] If the values of a frequency distribution lie between (20 , 60) , then the range of this distribution = ...

3 [a] If the ratio among the measurements of the angles of a triangle is 1 : 2 : 3 Find the measure for each angle and mention the type of this triangle according to the measures of its angles.

[b] If the length of the Suez Canal on a map of drawing scale 1 : 1 100 000 is 15 cm. Find its real length in kilometres.

4 **[a]** A company sells a computer set for L.E. 2 688 , if the percentage of the profit is 12 % Find the company's buying price of a computer set.

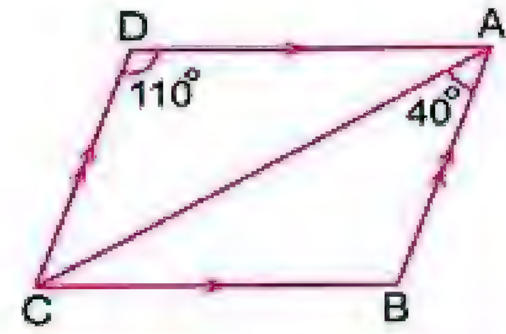
[b] ***In the opposite figure :***

ABCD is parallelogram where

m (∠ D) = 110°

, m (∠ BAC) = 40°

Find : m (∠ B) , m (∠ DAC)



5 **[a]** A case in the shape of a cuboid , its base is a square shaped of side length 6 cm. and its height is 15 cm. Calculate its volume.

[b] ***The following table shows the marks of 100 pupils in one month in maths :***

Marks	20 –	30 –	40 –	50 –	Sum
Number of pupils	15	30	40	15	100

Draw the frequency curve for this distribution.

Guide Answers of the Main Book



Unit One

Exercise 1

1

First term (antecedent)	Second term (consequent)	Two ways of writing
2	3	$\frac{2}{3}$ or 2 : 3
3	7	$\frac{3}{7}$ or 3 : 7
4	5	$\frac{4}{5}$ or 4 : 5
8	7	$\frac{8}{7}$ or 8 : 7

2 [a] 1 : 3 [b] 2 : 3 [c] 2 : 1

3 [a] $\frac{1}{2}$ [b] $\frac{3}{2}$
[c] $\overline{AB}$ [d] $\frac{2}{3}$

4
[a] 6 : 8 (÷ 2)
3 : 4

[b] 15 : 24 (÷ 3)
5 : 8

[c] 27 : 36 (÷ 9)
3 : 4

[d] 21 : 9 (÷ 3)
7 : 3

[e] 7 : 21 (÷ 7)
1 : 3

[f] 25 : 75 (÷ 5)
5 : 15 (÷ 5)
1 : 3

[g] 55 : 121 (÷ 11)
5 : 11

[h] 500 : 700 (÷ 100)
5 : 7

[i] 30 : 45 (÷ 5)
6 : 9 (÷ 3)
2 : 3

[j] 72 : 90 (÷ 9)
8 : 10 (÷ 2)
4 : 5

[k] 28 : 14 (÷ 7)
4 : 2 (÷ 2)
2 : 1

[l] 14 : 42 (÷ 7)
2 : 6 (÷ 2)
1 : 3

[m] 18 : 54 (÷ 9)
2 : 6 (÷ 2)
1 : 3

[n] 17 : 85 (÷ 17)
1 : 5

[o] 19 : 114 (÷ 19)
1 : 6

[p] 57 : 76 (÷ 19)
3 : 4

5 [a] $\frac{1}{2}$: $\frac{1}{4}$ (× 4)
$\frac{1}{\cancel{2}_1} \times \cancel{4}^{2}$: $\frac{1}{\cancel{4}_1} \times \cancel{4}^{1}$
2 : 1

Another Solution :
$\frac{1}{2} : \frac{1}{4} = \frac{1}{2} \div \frac{1}{4} = \frac{1}{\cancel{2}_1} \times \frac{\cancel{4}^{2}}{1} = \frac{2}{1} = 2 : 1$

[b] $\frac{1}{2}$: $\frac{3}{4}$ (× 4)
$\frac{1}{\cancel{2}_1} \times \cancel{4}^{2}$: $\frac{3}{\cancel{4}_1} \times \cancel{4}^{1}$
2 : 3

[c] $\frac{4}{5}$: $\frac{2}{5}$ (× 5)
$\frac{4}{\cancel{5}_1} \times \cancel{5}^{1}$: $\frac{2}{\cancel{5}_1} \times \cancel{5}^{1}$
4 : 2 (÷ 2)
2 : 1

[d] $\frac{2}{3}$: $\frac{3}{4}$ (× 12)
$\frac{2}{\cancel{3}_1} \times \cancel{12}^{4}$: $\frac{3}{\cancel{4}_1} \times \cancel{12}^{3}$
8 : 9

[e] $\frac{3}{4}$: $\frac{5}{6}$ (× 12)
$\frac{3}{\cancel{4}_1} \times \cancel{12}^{3}$: $\frac{5}{\cancel{6}_1} \times \cancel{12}^{2}$
9 : 10

[f] $\frac{5}{8}$: $\frac{3}{4}$ (× 8)
$\frac{5}{\cancel{8}_1} \times \cancel{8}^{1}$: $\frac{3}{\cancel{4}_1} \times \cancel{8}^{2}$
5 : 6

[g] $\frac{1}{3}$: 2 (× 3)
$\frac{1}{\cancel{3}_1} \times \cancel{3}^{1}$: 2 × 3
1 : 6

[h] 5 : $\frac{4}{5}$ (× 5)
5 × 5 : $\frac{4}{\cancel{5}_1} \times \cancel{5}^{1}$
25 : 4

[i] $1\frac{1}{2}$: $1\frac{1}{4}$
"change into improper fractions"
$\frac{3}{2}$: $\frac{5}{4}$ (× 4)
$\frac{3}{\cancel{2}_1} \times \cancel{4}^{2}$: $\frac{5}{\cancel{4}_1} \times \cancel{4}^{1}$
6 : 5

[j] $3\frac{4}{7}$: $3\frac{1}{8}$

"change into improper fractions"

$\frac{25}{7}$: $\frac{25}{8}$ (× 56)

$\frac{25}{_1\cancel{7}} \times \cancel{56}^{8}$: $\frac{25}{_1\cancel{8}} \times \cancel{56}^{7}$

200 : 175 (÷ 5)

40 : 35 (÷ 5)

8 : 7

[k] 3 : $4\frac{3}{4}$

"change into improper fractions"

3 : $\frac{19}{4}$ (× 4)

3 × 4 : $\frac{19}{_1\cancel{4}} \times \cancel{4}^{1}$

12 : 19

[l] $\frac{3}{8}$: $2\frac{1}{4}$

"change into improper fractions"

$\frac{3}{8}$: $\frac{9}{4}$ (× 8)

$\frac{3}{_1\cancel{8}} \times \cancel{8}^{1}$: $\frac{9}{_1\cancel{4}} \times \cancel{8}^{2}$

3 : 18 (÷ 3)

1 : 6

6 [a] 1.5 : 3 (× 10)

15 : 30 (÷ 5)

3 : 6 (÷ 3)

1 : 2

[b] 6.4 : 16 (× 10)

64 : 160 (÷ 4)

16 : 40 (÷ 8)

2 : 5

[c] 1.2 : 3.6 (× 10)

12 : 36 (÷ 4)

3 : 9 (÷ 3)

1 : 3

[d] 2.5 : 3.5 (× 10)

25 : 35 (÷ 5)

5 : 7

[e] 18 : 6.3 (× 10)

180 : 63 (÷ 9)

20 : 7

[f] 5.5 : 22 (× 10)

55 : 220 (÷ 5)

11 : 44 (÷ 11)

1 : 4

[g] 6.3 : 18.9 (× 10)

63 : 189 (÷ 9)

7 : 21 (÷ 7)

1 : 3

[h] 1.5 : $1\frac{3}{4}$

"change into improper fractions"

$\frac{15}{10}$: $\frac{7}{4}$ (× 20)

$\frac{15}{_1\cancel{10}} \times \cancel{20}^{2}$: $\frac{7}{_1\cancel{4}} \times \cancel{20}^{5}$

30 : 35 (÷ 5)

6 : 7

[i] $3\frac{1}{8}$: $6\frac{1}{4}$

"change into improper fractions"

$\frac{25}{8}$: $\frac{25}{4}$ (× 8)

$\frac{25}{_1\cancel{8}} \times \cancel{8}^{1}$: $\frac{25}{_1\cancel{4}} \times \cancel{8}^{2}$

25 : 50 (÷ 5)

5 : 10 (÷ 5)

1 : 2

[j] 2.4 : $2\frac{2}{5}$

"change into improper fractions"

$\frac{24}{10}$: $\frac{12}{5}$ (× 10)

$\frac{24}{_1\cancel{10}} \times \cancel{10}^{1}$: $\frac{12}{_1\cancel{5}} \times \cancel{10}^{2}$

24 : 24 (÷ 24)

1 : 1

[k] 3.2 : $\frac{8}{5}$

"change into improper fractions"

$\frac{32}{10}$: $\frac{8}{5}$ (× 10)

$\frac{32}{_1\cancel{10}} \times \cancel{10}^{1}$: $\frac{8}{_1\cancel{5}} \times \cancel{10}^{2}$

32 : 16 (÷ 4)

8 : 4 (÷ 4)

2 : 1

[l] $5\frac{1}{4}$: $7\frac{7}{8}$

"change into improper fractions"

$\frac{21}{4}$: $\frac{63}{8}$ (× 8)

$\frac{21}{_1\cancel{4}} \times \cancel{8}^{2}$: $\frac{63}{_1\cancel{8}} \times \cancel{8}^{1}$

42 : 63 (÷ 7)

6 : 9 (÷ 3)

2 : 3

[m] $1\frac{3}{5}$: 2.2

"change into improper fractions"

$\frac{8}{5}$: $\frac{22}{10}$ (× 10)

$\frac{8}{_1\cancel{5}} \times \cancel{10}^{2}$: $\frac{22}{_1\cancel{10}} \times \cancel{10}$

16 : 22 (÷ 2)

8 : 11

[n] 2.3 : 5.75 (× 100)

230 : 575 (÷ 5)

46 : 115 (÷ 23)

2 : 5

[o] 0.84 : $2\frac{3}{9}$

"change into improper fractions"

$\frac{84}{100}$: $\frac{21}{9}$ (× 900)

$\frac{84}{_1\cancel{100}} \times \cancel{900}^{9}$: $\frac{21}{_1\cancel{9}} \times \cancel{900}^{100}$

756 : 2100 (÷ 4)

189 : 525 (÷ 3)

63 : 175 (÷7)

9 : 25

7 [a] $\frac{8}{12} = \frac{2}{3}$ or 2 : 3

[b] $\frac{14}{128} = \frac{7}{64}$ or 7 : 64

[c] $\frac{2.4}{18} = \frac{24}{180} = \frac{6}{45} = \frac{2}{15}$ or 2 : 15

[d] $\frac{185}{370} = \frac{37}{74} = \frac{1}{2}$ or 1 : 2

8 [a] L.C.M. of the denominators = 8

The two ratios become : $\frac{6}{8}$ and $\frac{5}{8}$

, then $\frac{6}{8} > \frac{5}{8}$, then $\frac{3}{4} > \frac{5}{8}$

[b] L.C.M. of the denominators = 99

The two ratios become : $\frac{27}{99}$ and $\frac{22}{99}$

, then $\frac{27}{99} > \frac{22}{99}$, then $\frac{3}{11} > \frac{2}{9}$

[c] L.C.M. of the denominators = 24

The two ratios become : $\frac{9}{24}$ and $\frac{10}{24}$

, then $\frac{9}{24} < \frac{10}{24}$, then $\frac{3}{8} < \frac{5}{12}$

[d] L.C.M. of the denominators = 24

The two ratios become : $\frac{4}{24}$ and $\frac{5}{24}$

, then $\frac{4}{24} < \frac{5}{24}$, then $\frac{1}{6} < \frac{5}{24}$

9 [a] $\frac{\text{First number}}{\text{Second number}}$ [b] a , b [c] 1 : 4

[d] 4 : 1 [e] 1 : 3 [f] 4 : 3

[g] 2 [h] 8 [i] 2 : 3

10 [a] $\frac{56}{126}$ [b] π : 1 [c] 3 : 1

[d] 2 π : 1 [e] 1 : 1 [f] 4 : 1

[g] 3 : 2 [h] 3 : 16 [i] 1 : 1

11 40 : 105 = 8 : 21

12 The number of girls = 480 – 320 = 160 girls.

[a] 320 : 160 = 2 : 1 [b] 320 : 480 = 2 : 3

[c] 160 : 480 = 1 : 3

13 What the accountant spends = $\frac{3}{4}$ × 4 000 = L.E. 3 000

The ratio between what the accountant spends to his monthly salary = 3 000 : 4 000 = 3 : 4

14 [a] 14 cm. [b] 7 cm.

[c] 2 : 1 [d] 2 : 1

15 [a] The perimeter of the square = 4 × 4 = 16 cm.

The perimeter of the rectangle = (6 + 3) × 2 = 18 cm.

The perimeter of the square : the perimeter of the rectangle = 16 : 18 = 8 : 9

[b] The area of the square = 4 × 4 = 16 cm²

The area of the rectangle = 6 × 3 = 18 cm²

The area of the square : the area of the rectangle = 16 : 18 = 8 : 9

[c] 1 : 3

16 [a] The length of the rectangle = 32 ÷ 4 = 8 cm.

[b] 1 : 2

[c] The perimeter of the rectangle = (8 + 4) × 2 = 24 cm.

The length of the rectangle : the perimeter of the rectangle = 8 : 24 = 1 : 3

17 [a] The height of the triangle = $\frac{24 \times 2}{8}$ = 6 cm.

[b] The base length : the height = 8 : 6 = 4 : 3

18 [a] The width = 6 ÷ 2 = 3 cm.
The perimeter of the rectangle
= (6 + 3) × 2 = 18 cm.
The perimeter : the width = 18 : 3 = 6 : 1
[b] The perimeter : the length = 18 : 6 = 3 : 1
[c] The area of the rectangle = 6 × 3 = 18 cm^2
The side length of the square = 18 ÷ 4 = 4.5 cm.
The area of the square
= 4.5 × 4.5 = 20.25 cm^2
The area of the rectangle : the area of the square = 18 : 20.25 = 8 : 9

19 [a] The length : the perimeter = 2 : 6 = 1 : 3
[b] The width : the perimeter = 1 : 6

20 1 : 3

Exercise 2

1 [a] 3000 gm. : 5 kg.
"5 kg. = 5 × 1000 = 5000 gm."
3000 gm. : 5000 gm.
3000 : 5000 (÷ 1000)
3 : 5

[b] P.T. 25 : L.E. 2
"L.E. 2 = 2 × 100 = P.T. 200"
P.T. 25 : P.T. 200
25 : 200 (÷ 5)
5 : 40 (÷ 5)
1 : 8

[c] 18 hours : one day
"one day = 1 × 24 = 24 hours"
18 hours : 24 hours
18 : 24 (÷ 6)
3 : 4

[d] 1.75 metres : 150 cm.
"1.75 metres = 1.75 × 100 = 175 cm."
175 cm. : 150 cm.
175 : 150 (÷ 5)
35 : 30 (÷ 5)
7 : 6

[e] $2\frac{1}{2}$ an hour : 75 minutes
"$2\frac{1}{2}$ an hour = $2\frac{1}{2}$ × 60 = 150 minutes"
150 minutes : 75 minutes
150 : 75 (÷ 5)
30 : 15 (÷ 5)
6 : 3 (÷ 3)
2 : 1

[f] 12 kirats : 1.25 feddan
"1.25 feddan = 1.25 × 24 = 30 kirats"
12 kirats : 30 kirats
12 : 30 (÷ 6)
2 : 5

[g] P.T. 225 : L.E. $4\frac{1}{2}$
"L.E. $4\frac{1}{2}$ = $4\frac{1}{2}$ × 100 = P.T. 450"
P.T. 225 : P.T. 450
225 : 450 (÷ 5)
45 : 90 (÷ 9)
5 : 10 (÷ 5)
1 : 2

[h] 0.75 kirat : 16 sahms
"0.75 kirat = 0.75 × 24 = 18 sahms"
18 sahms : 16 sahms
18 : 16 (÷ 2)
9 : 8

[i] 7.5 dm. : 30 cm.
"7.5 dm. = 7.5 × 10 = 75 cm."
75 cm. : 30 cm.
75 : 30 (÷ 5)
15 : 6 (÷ 3)
5 : 2

[j] 0.6 km. : 250 m.
"0.6 km. = 0.6 × 1000 = 600 m."
600 m. : 250 m.
600 : 250 (÷ 10)
60 : 25 (÷ 5)
12 : 5

[k] 8 hours : $3\frac{1}{3}$ days
"$3\frac{1}{3}$ days = $3\frac{1}{3}$ × 24 = 80 hours"
8 hours : 80 hours
8 : 80 (÷ 8)
1 : 10

[l] 30 months : 3 years
"3 years = 3 × 12 = 36 months"
30 months : 36 months
30 : 36 (÷ 6)
5 : 6

[m] $5\frac{1}{4}$ pounds : 125 piastres
"$5\frac{1}{4}$ pounds = $5\frac{1}{4}$ × 100 = 525 piastres"
525 piastres : 125 piastres
525 : 125 (÷ 5)
105 : 25 (÷ 5)
21 : 5

[n] $2\frac{1}{4}$ m. : 125 cm.
"$2\frac{1}{4}$ m. = $2\frac{1}{4}$ × 100 = 225 cm."
225 cm. : 125 cm.
225 : 125 (÷ 5)
45 : 25 (÷ 5)
9 : 5

[o] 2.25 feddans : 16 kirats
"2.25 feddans = 2.25 × 24 = 54 kirats"
54 kirats : 16 kirats
54 : 16 (÷ 2)
27 : 8

[p] 150 mL. : $\frac{1}{4}$ L.
"$\frac{1}{4}$ L. = $\frac{1}{4}$ × 1000 = 250 mL."
150 mL. : 250 mL.
150 : 250 (÷ 10)
15 : 25 (÷ 5)
3 : 5

2 [a] 2 : 1 [b] 5 : 6 [c] 1 : 2
[d] 3 : 2 [e] 2 : 3 [f] 2 : 3
[g] 9 : 10 [h] 7 : 5 [i] 1 : 3
[j] 1 : 3

3 [a] 1 : 2 [b] 3 : 2 [c] 1 : 4
[d] 5 : 2 [e] $\frac{1}{3}$ [f] 5 : 4
[g] 1 : 2 [h] 3 : 4 [i] 7 : 5
[j] 3 : 5

4 [a] "$\frac{1}{2}$ kg. = $\frac{1}{2}$ × 1000 = 500 gm."
, then 250 gm. < 500 gm.
250 : 500 (÷ 10)
25 : 50 (÷ 5)
5 : 10 (÷ 5)
1 : 2

[b] " 2 kirats = 2 × 24 = 48 sahms "
, then 48 sahms > 18 sahms
48 : 18 (÷ 6)
8 : 3

[c] "1.8 m. = 1.8 × 100 = 180 cm."
, then 180 cm. > 30 cm.
180 : 30 (÷ 10)
18 : 3 (÷ 3)
6 : 1

[d] "$2\frac{1}{3}$ days = $2\frac{1}{3}$ × 24 = 56 hours"
, then 56 hours > 7 hours
56 : 7 (÷ 7)
8 : 1

5 Karim : His father
1.2 m. : 180 cm.
"1.2 m. = 1.2 × 100 = 120 cm."
120 cm. : 180 cm.
120 : 180 (÷ 10)
12 : 18 (÷ 6)
2 : 3

6 The load of the 1st : The load of the 2nd
600 kg. : $1\frac{1}{2}$ ton
"$1\frac{1}{2}$ ton = $1\frac{1}{2}$ × 1000 = 1500 kg."
600 kg. : 1500 kg.
600 : 1500 (÷ 100)
6 : 15 (÷ 3)
2 : 5

7 [a] 725 piastres : L.E. 15

"L.E. 15 = 15 × 100 = P.T. 1500"

The money he spent : the total amount

P.T. 725 : P.T. 1500

725 : 1500 (÷ 5)

145 : 300 (÷ 5)

29 : 60

[b] The money left with him = L.E. 15 – P.T. 725

= 1500 – 725

= P.T. 775

The money left with him : the total amount

P.T. 775 : P.T. 1500

775 : 1500 (÷ 5)

155 : 300 (÷ 5)

31 : 60

[c] The money left with him : the money he spent

P.T. 775 : P.T. 725

775 : 725 (÷ 5)

155 : 145 (÷ 5)

31 : 29

8 [a] Width : Length

120 cm. : 2 m.

"2 m. = 2 × 100 = 200 cm."

120 cm. : 200 cm.

120 : 200 (÷ 10)

12 : 20 (÷ 4)

3 : 5

[b] The perimeter = (200 + 120) × 2

= 640 cm.

Length : Perimeter

200 cm. : 640 cm.

200 : 640 (÷ 10)

20 : 64 (÷ 4)

5 : 16

9 "0.16 m. = 0.16 × 100 = 16 cm."

The area of the triangle ABC

$= \frac{1}{2} \times b \times h = \frac{1}{2} \times 16 \times 9 = 72$ cm^2

The area of the square XYZL

$= S \times S = 9 \times 9 = 81$ cm^2

The area of the triangle ABC :

The area of the square XYZL

72 cm^2 : 81 cm^2

72 : 81 (÷ 9)

8 : 9

10 [a] The perimeter of the triangle ABC

= 3 + 4 + 5 = 12 cm.

"1.4 dm. = 1.4 × 10 = 14 cm."

The perimeter of the parallelogram XYZL

= (6 + 14) × 2 = 40 cm.

The perimeter of the triangle ABC :

The perimeter of the parallelogram XYZL

12 cm. : 40 cm.

12 : 40 (÷ 4)

3 : 10

[b] The area of the triangle ABC

$= \frac{1}{2} \times b \times h = \frac{1}{2} \times 3 \times 4 = 6$ cm^2

"$\frac{1}{2}$ dm. $= \frac{1}{2} \times 10 = 5$ cm."

The area of the parallelogram XYZL

= b × h = 14 × 5 = 70 cm^2

The area of the parallelogram XYZL :

The area of the triangle ABC

70 cm^2 : 6 cm^2

70 : 6 (÷ 2)

35 : 3

11 The perimeter of the rhombus ABCD

= S × 4 = 2 × 4 = 8 m. = 800 cm.

The circumference of the circle M

$= 2\pi r = 2 \times \frac{22}{7} \times 35 = 220$ cm.

The perimeter of the rhombus ABCD :

The circumference of the circle M

800 cm. : 220 cm.

800 : 220 (÷ 10)

80 : 22 (÷ 2)

40 : 11

12 "105 mm. = 105 ÷ 10 = 10.5 cm."

The circumference of the circle

$= 2\pi r = 2 \times \frac{22}{7} \times 10.5 = 66$ cm.

The perimeter of the square

= S × 4 = 7.5 × 4 = 30 cm.

The circumference of the circle :

The perimeter of the square

66 cm. : 30 cm.

66 : 30 (÷ 3)

22 : 10 (÷ 2)

11 : 5

13 "2.8 dm. = 2.8 × 10 = 28 cm."

The circumference of the circle

$= \pi d = \frac{22}{7} \times 28 = 88$ cm.

The perimeter of the rectangle

= (L + W) × 2 = (7 + 5) × 2 = 24 cm.

The circumference of the circle :

The perimeter of the rectangle

88 cm. : 24 cm.

88 : 24 (÷ 4)

22 : 6 (÷ 2)

11 : 3

14 The perimeter of the triangle

= 6 + 8 + 10 = 24 cm.

The perimeter of the rhombus

= 0.15 × 4 = 0.6 m. = 60 cm.

The perimeter of the triangle :

The perimeter of the rhombus

24 cm. : 60 cm.

24 : 60 (÷ 12)

2 : 5

15 The length of the rectangle = 3.2 m.

= 3.2 × 100 = 320 cm.

The side length of the triangle

= 2.5 m. = 2.5 × 100 = 250 cm.

The perimeter of the rectangle

= (L + W) × 2 = (320 + 280) × 2

= 1200 cm.

The perimeter of the equilateral triangle

= S × 3 = 250 × 3 = 750 cm.

The perimeter of the rectangle :

The perimeter of the triangle

1200 cm. : 750 cm.

1200 : 750 (÷ 10)

120 : 75 (÷ 5)

24 : 15 (÷ 3)

8 : 5

16 The area of the sqaure $= \frac{1}{2} \times d \times d$

$= \frac{1}{2} \times 8 \times 8 = 32$ cm^2

The area of the parallelogram = b × h = 10 × 6

= 60 cm^2

The area of the square : the area of the parallelogram

32 cm^2 : 60 cm^2

32 : 60 (÷ 2)

16 : 30 (÷ 2)

8 : 15

17 The area of the parallelogram

= b × h = 6.2 × 3.8 = 23.56 cm^2

The area of the rhombus

$= \frac{1}{2} \times d_1 \times d_2 = \frac{1}{2} \times 6.2 \times 3.8 = 11.78$ cm^2

The area of the parallelogram :

The area of the rhombus

23.56 cm^2 : 11.78 cm^2

23.56 : 11.78 (× 100)

2356 : 1178 (÷ 2)

1178 : 589 (÷ 19)

62 : 31 (÷ 31)

2 : 1

18 The perimeter of the rectangle

= 6.4 m. = 6.4 × 100 = 640 cm.

[a] The length of the rectangle

$= \frac{640}{2} - 120 = 320 - 120 = 200$ cm.

[b] Length : Width

200 cm. : 120 cm.

200 : 120 (÷ 10)

20 : 12 (÷ 4)

5 : 3

[c] Length : Perimeter

200 cm. : 640 cm.

200 : 640 (÷ 10)

20 : 64 (÷ 4)

5 : 16

[d] Width : Perimeter

120 cm. : 640 cm.

120 : 640 (÷ 10)

12 : 64 (÷ 4)

3 : 16



Length : Width : Sum
9 : 5 : 14
? : ? : 28

The length = $\frac{9 \times 28}{14}$ = 18 m.

The width = $\frac{5 \times 28}{14}$ = 10 m.

The area of the rectangle = 18 × 10 = 180 m^2

23 [a] Half of the perimeter = 660 ÷ 2 = 330 m.
Length + Width = 330 m.
Width : Length : Sum
5 : 6 : 11
? : ? : 330
The width = $\frac{5 \times 330}{11}$ = 150 m.
The length = $\frac{6 \times 330}{11}$ = 180 m.

[b] The area = 150 × 180 = 27 000 m^2

24 [a] CH : HB
2 : 3
6 : ?
HB = $\frac{6 \times 3}{2}$ = 9 cm.
The length of $\overline{BC}$ = 9 + 6 = 15 cm.
The length of $\overline{AD}$ = 15 cm.

[b] The perimeter of the shaded part
= 15 + 8 + 9 + 6 + 6 + 2 = 46 cm.

[c] The area of the square = 6 × 6
= 36 cm^2
The area of the rectangle = 15 × 8
= 120 cm^2

Area of square : Area of rectangle
36 cm^2 : 120 cm^2
36 : 120(÷ 6)
6 : 20 (÷ 2)
3 : 10

[d] The area of the shaded part = 120 – 36
= 84 cm^2

"Try by yourself to find other ways for calculating the area of the shaded part"

25 [a] 125 [b] 63 [c] 800 [d] 12
[e] 12 [f] 3 : 4 [g] 8 cm.

26 The side length of the triangle = $\frac{18}{3}$ = 6 cm.
AD = 6 cm.
AD : AB
2 : 3
6 : ?
AB = $\frac{3 \times 6}{2}$ = 9 cm.
The area of the rectangle = AB × AD
= 9 × 6 = 54 cm^2

27 First part : Second part : Sum
2 : 3 : 5
? : ? : 40
The length of the first part = $\frac{2 \times 40}{5}$ = 16 cm.
The length of the second part
= $\frac{3 \times 40}{5}$ = 24 cm.
The side length of the square
= Perimeter ÷ 4 = 16 ÷ 4 = 4 cm.
The side length of the equilateral triangle
= Perimeter ÷ 3 = 24 ÷ 3 = 8 cm.

28 The sum of the two numbers = 95 × $\frac{16}{19}$ = 80
1st number : 2nd number : Sum
7 : 9 : 16
? : ? : 80
The first number = $\frac{7 \times 80}{16}$ = 35
The second number = $\frac{9 \times 80}{16}$ = 45

Exercise 4

1 [a] 12 : 18 : 36 (÷ 6)
2 : 3 : 6

[b] 45 : 30 : 75 (÷ 5)
9 : 6 : 15 (÷ 3)
3 : 2 : 5

[c] 21 : 63 : 35 (÷ 7)
3 : 9 : 5

[d] 56 : 32 : 40 (÷ 8)
7 : 4 : 5

[e] 5.4 : 7.2 : 4.8 (× 10)
54 : 72 : 48 (÷ 6)
9 : 12 : 8

[f] 2.4 : 1.8 : 3 (× 10)
24 : 18 : 30 (÷ 6)
4 : 3 : 5

[g] $\frac{1}{2}$: $\frac{2}{3}$: $\frac{1}{4}$ (× 12)
$\frac{1}{2} \times 12$: $\frac{2}{3} \times 12$: $\frac{1}{4} \times 12$
6 : 8 : 3

[h] $\frac{1}{4}$: $\frac{2}{5}$: $\frac{3}{10}$ (× 20)
$\frac{1}{4} \times 20$: $\frac{2}{5} \times 20$: $\frac{3}{10} \times 20$
5 : 8 : 6

[i] $\frac{2}{3}$: $\frac{3}{4}$: $\frac{1}{2}$ (× 12)
$\frac{2}{3} \times 12$: $\frac{3}{4} \times 12$: $\frac{1}{2} \times 12$
8 : 9 : 6

[j] $\frac{1}{2}$: $\frac{1}{3}$: $\frac{1}{5}$ (× 30)
$\frac{1}{2} \times 30$: $\frac{1}{3} \times 30$: $\frac{1}{5} \times 30$
15 : 10 : 6

[k] $1\frac{1}{2}$: $1\frac{1}{8}$: $\frac{3}{4}$
"change into improper fraction"
$\frac{3}{2}$: $\frac{9}{8}$: $\frac{3}{4}$ (× 8)
$\frac{3}{2} \times 8$: $\frac{9}{8} \times 8$: $\frac{3}{4} \times 8$
12 : 9 : 6 (÷ 3)
4 : 3 : 2

[l] $7\frac{1}{2}$: $2\frac{1}{4}$: $4\frac{1}{2}$
"change into improper fraction"
$\frac{15}{2}$: $\frac{9}{4}$: $\frac{9}{2}$ (× 4)
$\frac{15}{2} \times 4$: $\frac{9}{4} \times 4$: $\frac{9}{2} \times 4$
30 : 9 : 18 (÷ 3)
10 : 3 : 6

[m] $\frac{1}{2}$: 2 : $2\frac{1}{4}$
"change into improper fraction"
$\frac{1}{2}$: 2 : $\frac{9}{4}$ (× 4)
$\frac{1}{2} \times 4$: 2 × 4 : $\frac{9}{4} \times 4$
2 : 8 : 9

[n] $\frac{3}{4}$: 1.5 : $\frac{1}{2}$
"change into improper fraction"
$\frac{3}{4}$: $\frac{3}{2}$: $\frac{1}{2}$ (× 4)
$\frac{3}{4} \times 4$: $\frac{3}{2} \times 4$: $\frac{1}{2} \times 4$
3 : 6 : 2

2 [a] 4500 gm. = $4\frac{1}{2}$ kg.
7 kg. : $2\frac{1}{2}$ kg. : $4\frac{1}{2}$ kg.
7 : $2\frac{1}{2}$: $4\frac{1}{2}$
"change into improper fraction"
7 : $\frac{5}{2}$: $\frac{9}{2}$ (× 2)
7 × 2 : $\frac{5}{2} \times 2$: $\frac{9}{2} \times 2$
14 : 5 : 9

Another solution
7 kg. = 7000 gm. , $2\frac{1}{2}$ kg. = 2500 gm.
7000 gm. : 2500 gm. : 4500 gm.
7000 : 2500 : 4500 (÷ 100)
70 : 25 : 45 (÷ 5)
14 : 5 : 9

[b] 2.8 km. = 2800 m. , 15.4 km. = 15400 m.
2800 m. : 9800 m. : 15400 m.
2800 : 9800 : 15400 (÷ 100)
28 : 98 : 154 (÷ 2)
14 : 49 : 77 (÷ 7)
2 : 7 : 11

[c] 2.1 m. = 210 cm. , 0.49 m. = 49 cm.
210 cm. : 140 cm. : 49 cm.
210 : 140 : 49 (÷ 7)
30 : 20 : 7



[d] P.T. 3200 = L.E. 32

L.E. 8 : L.E. 12 : L.E. 32

8 : 12 : 32 (÷ 4)

2 : 3 : 8

[e] $1\frac{1}{4}$ feddan = 30 kirats = 720 sahms

, 18 kirats = 432 sahms.

720 sahms : 432 sahms : 288 sahms

720 : 432 : 288 (÷ 4)

180 : 108 : 72 (÷ 4)

45 : 27 : 18 (÷ 9)

5 : 3 : 2

[f] 7.5 m. = 750 cm. , 25 dm. = 250 cm.

250 cm. : 500 cm. : 750 cm.

250 : 500 : 750 (÷ 10)

25 : 50 : 75 (÷ 5)

5 : 10 : 15 (÷ 5)

1 : 2 : 3

3 [a] 2 : 5 [b] 4 : 7 [c] 8 : 9

[d] 6 : 8 : 5 [e] 4 : 7 : 9 [f] 20 : 27

[g] 6 : 9 : 8 [h] 1 : 1

4 [a] 7 : 2 : 1 [b] 3 : 5 [c] 4 : 15

[d] 2 : 1 [e] 30° [f] 4 : 7

5 1st building : 2nd building : 3rd building

3 : 4 : 5

12 : ? : ?

The height of the second building

$= \frac{4 \times 12}{3} = 16$ m.

The height of the third building

$= \frac{5 \times 12}{3} = 20$ m.

6 TV : Oven : Fridge

4 : 5 : 8

1200 : ? : ?

The price of the oven $= \frac{5 \times 1200}{4}$ = L.E. 1500

The price of the fridge $= \frac{8 \times 1200}{4}$ = L.E. 2400

7 1st lorry : 2nd lorry : 3rd lorry

11 : 9 : 13

? : 108 : ?

The load of the first lorry $= \frac{11 \times 108}{9} = 132$ kg.

The load of the third lorry $= \frac{13 \times 108}{9} = 156$ kg.

8 1st number : 2nd number : 3rd number : Sum

3 : 5 : 7 : 15

? : ? : ? : 45

The first number $= \frac{3 \times 45}{15} = 9$

The second number $= \frac{5 \times 45}{15} = 15$

The third number $= \frac{7 \times 45}{15} = 21$

9 1st grade : 2nd grade : 3rd grade : Sum

5 : 4 : 3 : 12

? : ? : ? : 240

The number of first grade pupils

$= \frac{5 \times 240}{12} = 100$ pupils.

The number of second grade pupils

$= \frac{4 \times 240}{12} = 80$ pupils.

The number of third grade pupils

$= \frac{3 \times 240}{12} = 60$ pupils.

10 1st factory : 2nd factory : 3rd factory : Sum (1st + 2nd)

3 : 2 : 1 : 5

? : ? : ? : 25000

The production of the first factory

$= \frac{3 \times 25000}{5} = 15000$ sets.

The production of the second factory

$= \frac{2 \times 25000}{5} = 10000$ sets.

The production of the third factory

$= \frac{1 \times 25000}{5} = 5000$ sets.

11 Hoda : Mona : Ola : Difference

2 : 4 : 5 : 2

? : ? : ? : 8

Hoda's age $= \frac{2 \times 8}{2} = 8$ years.

Mona's age $= \frac{4 \times 8}{2} = 16$ years.

Ola's age $= \frac{5 \times 8}{2} = 20$ years.

12 Hoda : Ahmed : Samah : Difference

6 : 5 : 2 : 4

? : ? : ? : 200

What Hoda has $= \frac{6 \times 200}{4}$ = L.E. 300

What Ahmed has $= \frac{5 \times 200}{4}$ = L.E. 250

What Samah has $= \frac{2 \times 200}{4}$ = L.E. 100

13 1st factory : 2nd factory : 3rd factory : Difference

9 : 7 : 11 : 2

? : ? : ? : 1000

The production of the first factory

$= \frac{9 \times 1000}{2} = 4500$ tons.

The production of the second factory

$= \frac{7 \times 1000}{2} = 3500$ tons.

The production of the third factory

$= \frac{11 \times 1000}{2} = 5500$ tons.

14 4th grade : 5th grade : 6th grade : Difference

10 : 13 : 8 : 5

? : ? : ? : 45

The number of fourth grade pupils

$= \frac{10 \times 45}{5} = 90$ pupils.

The number of fifth grade pupils

$= \frac{13 \times 45}{5} = 117$ pupils.

The number of sixth grade pupils

$= \frac{8 \times 45}{5} = 72$ pupils.

15 AB : BC : AC

7 : 5 : 4

? : ? : 64

AB $= \frac{7 \times 64}{4} = 112$ cm.

BC $= \frac{5 \times 64}{4} = 80$ cm.

The perimeter = 64 + 112 + 80 = 256 cm.

16 1st side : 2nd side : 3rd side : Sum

2 : 3 : 4 : 9

? : ? : ? : 54

The length of the first side $= \frac{2 \times 54}{9}$ = 12 cm.

The length of the second side $= \frac{3 \times 54}{9}$ = 18 cm.

The length of the third side $= \frac{4 \times 54}{9}$ = 24 cm.

17 1st angle : 2nd angle : 3rd angle

5 : 6 : 7

50 : ? : ?

The measure of the second angle

$= \frac{6 \times 50}{5} = 60°$

The measure of the third angle

$= \frac{7 \times 50}{5} = 70°$

18 1st angle : 2nd angle : 3rd angle : Sum

3 : 7 : 8 : 18

: ? : 180

The greatest measure $= \frac{8 \times 180}{18} = 80°$

19 1st angle : 2nd angle : 3rd angle : Sum

1 : 2 : 3 : 6

? : ? : ? : 180

The measure of the first angle $= \frac{1 \times 180}{6} = 30°$

The measure of the second angle $= \frac{2 \times 180}{6}$ = 60°

The measure of the third angle $= \frac{3 \times 180}{6} = 90°$

The type of the triangle is right-angled triangle.

20 AB : BC : CA
3 : 4 : 5
12 : ? : ?

$BC = \frac{4 \times 12}{3} = 16$ cm.

$CA = \frac{5 \times 12}{3} = 20$ cm.

The perimeter = 12 + 16 + 20 = 48 cm.

The area = $\frac{1}{2} \times AB \times BC = \frac{1}{2} \times 12 \times 16$
$= 96 \text{ cm}^2$

21 1st side : 2nd side : 3rd side : Sum
4 : 6 : 7 : 17
? : ? : ? : 51

The length of the first side = $\frac{4 \times 51}{17} = 12$ m.

The length of the second side = $\frac{6 \times 51}{17} = 18$ m.

The length of the third side = $\frac{7 \times 51}{17} = 21$ m.

22 AB : BC : CA : Difference
3 : 5 : 7 : 2
? : ? : ? : 4

$AB = \frac{3 \times 4}{2} = 6$ cm.

$BC = \frac{5 \times 4}{2} = 10$ cm.

$CA = \frac{7 \times 4}{2} = 14$ cm.

The perimeter = 6 + 10 + 14 = 30 cm.

23

Noura's weight : Manar's weight : Nahla's weight
1 : 3 :
 : 2 : 5
2 : 6 : 15

24 Khalid : Ahmed : Hani
2 : 3 :
 : 4 : 5
8 : 12 : 15

The ratio between the height of Khalid to that of Hani = 8 : 15

25 Kamal : Ramzy : Hany
3 : 4 :
 : 5 : 2
15 : 20 : 8

26

Banana : Grapes : Guava
2 : 3 :
 : 2 : 4
4 : 6 : 12 (÷ 2)
2 : 3 : 6

27 [a] a : b : c
2 : 3 :
 : 4 : 7
8 : 12 : 21

[b] a : b : c
3 : 4
4 : 5
12 : 16 : 15

b : c = 16 : 15

[c] a : b : c
9 : 8
6 : 5
54 : 48 : 45 (÷ 3)
18 : 16 : 15

b : c = 16 : 15

[d] a : b : c = 7 : 9 : 16

[e] a : b : c = 5 : 3 : 8

28 Mina : Bassem : Esslam : Difference
3 : 4 : 5 : 2
? : ? : ? : 18

The share of Mina = $\frac{3 \times 18}{2}$ = L.E. 27

The share of Bassem = $\frac{4 \times 18}{2}$ = L.E. 36

The share of Esslam = $\frac{5 \times 18}{2}$ = L.E. 45

Exercise 5

1 [a] a ratio of two quantities with different measurement units
[b] 80 [c] 12.5 [d] 1.5
[e] 500 cans/hr. [f] 27 m. [g] 400 m.
[h] 2.5 [i] 6

2 [a] 60 [b] 25 [c] 4 [d] 4 [e] 2

3 The speed of the car = $\frac{240 \text{ km.}}{3 \text{ hr.}}$ = 80 km./hr.

4 The rate of consumption = $\frac{35 \text{ L}}{140 \text{ km.}}$
= 0.25 litre/ km.

5 The rate of consumption = $\frac{20 \text{ L}}{250 \text{ km.}}$
= 0.08 litre/ km.

6 The rate of what Hassan spends = $\frac{45 \text{ pounds}}{3 \text{ days}}$
= 15 pounds/ day

7 The rate of printing of the printer = $\frac{12 \text{ papers}}{4 \text{ min.}}$
= 3 papers/ min.

8 The rate of production = $\frac{5000 \text{ cans}}{8 \text{ hr.}}$
= 625 cans/ hr.

9 The rate of production = $\frac{7200 \text{ bottles}}{8 \text{ hr.}}$
= 900 bottles/ hr.

10 The rate of water leak = $\frac{20 \text{ L}}{5 \text{ hr.}}$ = 4 litres/ hr.
Please fix the leak.

11 The rate of consumption = $\frac{25 \text{ L}}{15 \text{ km.}}$
$= 1\frac{2}{3}$ litres / km.

12 The rate of used gallons = $\frac{3}{6}$ = 0.5 gallon/m^2

13 The rate of consumption of the 1st car
$= \frac{15 \text{ L}}{375 \text{ km.}}$ = 0.04 litre / km.
The rate of consumption of the 2nd car
$= \frac{17 \text{ L}}{340 \text{ km.}}$ = 0.05 litre / km.
Then، the first car consumes lower benzine than the second.

14 • $\frac{22 \text{ pounds}}{8 \text{ rulers}}$ = 2.75 pounds per ruler.
• $\frac{30 \text{ pounds}}{12 \text{ rulers}}$ = 2.5 pounds per ruler.
Then ، 12 rulers for 30 pounds is the better buy (because 2.5 < 2.75)

15 The first machine performance = $\frac{500 \text{ m.}}{2 \text{ hr.}}$
= 250 m./hr.
The second machine performance
$= \frac{600 \text{ m.}}{2.5 \text{ hr.}}$ = 240 m./ hr.
، then the first one is more efficient than the second.

16 The rate of factory (A) = $\frac{600 \text{ lamps}}{40 \text{ hr.}}$
= 15 lamps/hr.
The rate of factory (B) = $\frac{700 \text{ lamps}}{50 \text{ hr.}}$
= 14 lamps/hr.
، then the factory (A) has a better rate.

17 The rate of the first plough = $\frac{6 \text{ feddans}}{3 \text{ hr.}}$
= 2 feddans/hr.
The rate of the second plough = $\frac{10 \text{ feddans}}{4 \text{ hr.}}$
$= 2\frac{1}{2}$ feddans/ hr.
، then the second plough has a better rate.

18 The rate of the first runner = $\frac{9 \text{ m.}}{10 \text{ sec.}}$
= 0.9 m./sec.
The rate of the second runner
$= \frac{21 \text{ m.}}{0.5 \text{ min}} = \frac{21 \text{ m.}}{30 \text{ sec.}}$ = 0.7 m./sec.
The first runner is faster than the second runner.

19 The rate of first tap = $\frac{1}{6}$ aquarium/hour
The rate of second tap = $\frac{1}{3}$ aquarium/hour
The rate of third tap = $\frac{1}{2}$ aquarium/hour
If the three taps work together ، then the rate of three taps = $\frac{1}{6} + \frac{1}{3} + \frac{1}{2}$ = 1 aquarium/hour
، then the aquarium will be filled after 60 minutes.

Answers of unit test

1 [a] 1 : 3 [b] 1 : 3 [c] 30°
[d] $\frac{3}{2}$ [e] 8 : 7

2 [a] 20 : 7 [b] 1 : 5 [c] 5 : 8
[d] 28 [e] 1 : 2 π

3 c First : Second : Difference
7 : 4 : 3
? : ? : 9

The height of the first building = $\frac{7 \times 9}{3}$ = 21 m.

The height of the second building = $\frac{4 \times 9}{3}$ = 12 m.

[b] (1) The length of the rectangle = 75 ÷ 5 = 15 cm.

(2) The perimeter of the rectangle = (15 + 5) × 2 = 40 cm.

Length : Perimeter
15 : 40 (÷ 5)
3 : 8

4 [a] 1st side : 2nd side : 3rd side : Sum
3 : 7 : 5 : 15
? : ? : ? : 90

The length of the first side = $\frac{3 \times 90}{15}$ = 18 m.

The length of the second side = $\frac{7 \times 90}{15}$ = 42 m.

The length of the third side = $\frac{5 \times 90}{15}$ = 30 m.

[b] 8 × 24 = 192 kirats
4 × 60 = 240 minutes
The rate of the first tractor
= $\frac{192 \text{ kirats}}{240 \text{ minutes}}$ = 0.8 kirats/min.
The rate of the second tractor
= $\frac{18 \text{ kirats}}{20 \text{ minutes}}$ = 0.9 kirats/min.
, then the second tractor has a better rate.

5 [a] Half the perimeter = $\frac{550}{2}$ = 275 m.
Length + width = 275 m.
Length : width : Sum
7 : 4 : 11
? : ? : 275
The length = $\frac{7 \times 275}{11}$ = 175 m.
The width = $\frac{4 \times 275}{11}$ = 100 m.
The area of the rectangle
= 175 × 100 = 17500 m²

[b]
Samy's weight : Tamer's weight : Sherif's weight : Difference
8 : 7 : 9 : 2
? : ? : ? : 12.4

Samy's weight = $\frac{8 \times 12.4}{2}$ = 49.6 kg.

Tamer's weight = $\frac{7 \times 12.4}{2}$ = 43.4 kg.

Sherif's weight = $\frac{9 \times 12.4}{2}$ = 55.8 kg.

Unit Two

Exercise 6

1 [a] (× 3 / ÷ 3)

3	4	9	10	300	41
9	12	27	30	900	123

[b] (× 6 / ÷ 6)

2	5	6	8	10
12	30	36	48	60

[c] (× $\frac{2}{3}$ / ÷ $\frac{2}{3}$)

3	9	12	15	18	24	27
2	6	8	10	12	16	18

[d] (× 1.2 / ÷ 1.2)

5	10	30	60	75	135	150
6	12	36	72	90	162	180

2 [a] (7 × / ÷ 7)

35	5
14	2
63	9
98	14
17.5	2.5

[b] (4 × / ÷ 4)

16	4
4	1
24	6
40	10
64	16

$\frac{4}{16} = \frac{1}{4} = \frac{6}{24} = \frac{10}{40} = \frac{16}{64}$

[c] (× $\frac{5}{2}$ / $\frac{5}{2}$ ÷)

6	15
8	20
15	$37\frac{1}{2}$
12	30
14	35

$\frac{6}{15} = \frac{8}{20} = \frac{15}{37\frac{1}{2}} = \frac{12}{30} = \frac{14}{35}$

[d] (× $\frac{4}{7}$ / $\frac{4}{7}$ ÷)

7	4
14	8
35	20
4.9	2.8
6.3	3.6

$\frac{7}{4} = \frac{14}{8} = \frac{35}{20} = \frac{4.9}{2.8} = \frac{6.3}{3.6}$

[e] (5 × / ÷ 5)

6.5	1.3
15	3
7.5	1.5
13.75	2.75
12	2.4

$\frac{1.3}{6.5} = \frac{3}{15} = \frac{1.5}{7.5} = \frac{2.75}{13.75} = \frac{2.4}{12}$

[f] (× 2.2 / 2.2 ÷)

2	4.4
5	11
10	22
2.5	5.5
$2\frac{1}{11}$	$4\frac{3}{5}$

$\frac{2}{4.4} = \frac{5}{11} = \frac{10}{22} = \frac{2.5}{5.5} = \frac{2\frac{1}{11}}{4\frac{3}{5}}$

3 (× 8 / ÷ 8)

1	2	4	5	6	8
8	16	32	40	48	64

Some forms of proportion are :
$\frac{1}{8} = \frac{2}{16} = \frac{4}{32} = \frac{6}{48}$

"There are other solutions"

4

×80	5	2	9	15	10	9.5	6	÷80
	400	160	720	1200	800	760	480	

5

÷4	4	$1\frac{1}{2}$	2.4	1.25	1.45	$1\frac{3}{8}$	×4
	16	6	9.6	5	5.8	$5\frac{1}{2}$	

6

÷3	5	8	12	2.04	$\frac{1}{3}$	$\frac{5}{3}$	×3
	15	24	36	6.12	1	5	

Exercise 7

1 [a] $x = \frac{15 \times 8}{5} = 24$ [b] $x = \frac{2 \times 6}{1} = 12$

[c] $x = \frac{7 \times 8}{2} = 28$ [d] $x = \frac{20 \times 6}{30} = 4$

[e] $x = \frac{6 \times 35}{42} = 5$ [f] $x = \frac{1.25 \times 4}{5} = 1$

[g] $x = 3 \times 5 = 15$

[h] $\frac{24}{x} = \frac{8}{10}$ So, $x = \frac{10 \times 24}{8} = 30$

2 [a] 56 [b] 28 [c] 17.5 [d] $32\frac{2}{3}$

[e] 20 [f] 10 [g] 30 [h] 0.4

3 [a] $x = \frac{3 \times 14}{7} = 6$ [b] $x = \frac{9 \times 2}{5} = 3.6$

[c] $x = \frac{3.2 \times 0.8}{1.6} = 1.6$ [d] $x = \frac{0.2 \times 5}{6} = \frac{1}{6}$

4 [a] $\frac{2}{5} = \frac{6}{15} = \frac{3}{7.5} = \frac{5}{12\frac{1}{2}} = \frac{4}{10}$

[b] $\frac{0.3}{0.6} = \frac{0.6}{1.2} = \frac{7.5}{15} = \frac{0.75}{1.5} = \frac{10.5}{21}$

[c] $\frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15} = \frac{10}{30}$

[d] $\frac{3}{18} = \frac{5}{30} = \frac{7}{42} = \frac{8}{48} = \frac{12}{72}$

5 Let the missing term be x

[a] Since 5 , 6 , 10 and x are proportional,

then $\frac{5}{6} = \frac{10}{x}$ So, $x = \frac{6 \times 10}{5} = 12$

[b] Since x , 8 , 16 and 64 are proportional,

then $\frac{x}{8} = \frac{16}{64}$ So, $x = \frac{8 \times 16}{64} = 2$

[c] Since 18 , 36 , x and 10 are proportional,

then $\frac{18}{36} = \frac{x}{10}$ So, $x = \frac{18 \times 10}{36} = 5$

[d] Since 0.8 , 4.8 , x and 12 are proportional,

then $\frac{0.8}{4.8} = \frac{x}{12}$ So, $x = \frac{12 \times 0.8}{4.8} = 2$

[e] Since 5 , 10 , $7\frac{1}{2}$ and x are proportional,

then $\frac{5}{10} = \frac{7\frac{1}{2}}{x}$ So, $x = \frac{7\frac{1}{2} \times 10}{5} = 15$

[f] Since 6 , x , 10 and 3 are proportional,

then $\frac{6}{x} = \frac{10}{3}$ So, $x = \frac{3 \times 6}{10} = 1.8$

6 [a] $x = \frac{3 \times 21}{9} = 7$ [b] $x = \frac{5 \times 10}{25} = 2$

[c] $x = \frac{4 \times 9}{3} = 12$ [d] $x = \frac{12 \times 3}{4} = 9$

[e] $x = \frac{3\frac{1}{2} \times 2.1}{1\frac{1}{2}} = 4.9$

[f] $x = \frac{7\frac{1}{2} \times 4.5}{2.5} = 13.5$

7 [a] 6 [b] 17 [c] 8

[d] 16 [e] 28 [f] 9

[g] 12 [h] 5 [i] B × C

[j] 7 × 12

8 [a] = [b] $\frac{2}{3}$, $\frac{10}{15}$ [c] 6

[d] 27 [e] 16 [f] 10

[g] 2 [h] 4 [i] 6

[j] 2.5 [k] 7 [l] 28

[m] 90

9 [a] $x + 1 = \frac{5 \times 2}{2} = 5$ So, $x = 5 - 1 = 4$

[b] $x + 3 = \frac{1 \times 14}{2} = 7$ So, $x = 7 - 3 = 4$

[c] $x - 2 = \frac{1 \times 20}{4} = 5$ So, $x = 5 + 2 = 7$

[d] $7 + x = \frac{5 \times 16}{8} = 10$ So, $x = 10 - 7 = 3$

[e] $x - 5 = \frac{20 \times 3}{15} = 4$ So, $x = 4 + 5 = 9$

[f] $x + 7 = \frac{3 \times 4}{1} = 12$ So, $x = 12 - 7 = 5$

[g] $2x = \frac{32 \times 3}{4} = 24$ So, $x = 24 \div 2 = 12$

[h] $x - 9 = 2 \times 6 = 12$ So, $x = 12 + 9 = 21$

[i] $x + 18 = 8 \times 9 = 72$ So, $x = 72 - 18 = 54$

[j] $2x + 30 = 25 \times 4 = 100$

So, $2x = 100 - 30 = 70$

So, $x = 70 \div 2 = 35$

[k] $5(x - 3) = \frac{6 \times 10}{12} = 5$

So, $x - 3 = 5 \div 5 = 1$ So, $x = 1 + 3 = 4$

10

Orange in kg.	5	8
Price in L.E.	15	?

The price of 8 kg. $= \frac{8 \times 15}{5}$ = L.E. 24

11

Milk in litre	35	56
Butter in kg.	16	?

The number of kg. of butter

$= \frac{56 \times 16}{35} = 25.6$ kg.

12

Distance in km.	10	?
Time in hour	$2\frac{1}{2}$	5

The distance which the runner covers

$= \frac{10 \times 5}{2\frac{1}{2}} = 20$ km.

13

Flour in kg.	15	22.5
No. of loaves	150	?

No. of loaves $= \frac{150 \times 22.5}{15} = 225$ loaves.

14

Soap in litres	15	45	?
Price in L.E.	7.5	?	11.5

[a] The price $= \frac{7.5 \times 45}{15}$ = L.E. 22.5

[b] The number of litres $= \frac{11.5 \times 15}{7.5} = 23$ litres.

15

Petrol in litres	20	?
Distance in km.	210	630

The number of litres $= \frac{20 \times 630}{210} = 60$ litres.

16

Petrol in litres	16	?	24
Distance in km.	152	199.5	?

[a] The number of litres

$= \frac{199.5 \times 16}{152} = 21$ litres.

[b] The maximum distance that the car covers

$= \frac{24 \times 152}{16} = 228$ km.

17 The consumption rate of the car

$= \frac{20 \text{ litres}}{240 \text{ km.}} = \frac{1}{12}$ litre / km.

Petrol in litre	20	?
Distance in km.	240	600

The quantity of petrol $= \frac{20 \times 600}{240} = 50$ litres.

18

Height	22	?
Shade length	6	3

The height of the house $= \frac{3 \times 22}{6} = 11$ m.

19

Sugar	4.8	14.4	?
Apricot jam	6	?	15

[a] The number of kg. of jam

$= \frac{14.4 \times 6}{4.8} = 18$ kg.

[b] The number of kg. of sugar

$= \frac{4.8 \times 15}{6} = 12$ kg.

20

No. of machines	3	?
No. of feddans	32	256

The number of machines $= \frac{256 \times 3}{32}$

= 24 machines.

21

Height	14	?
Shade length	5	3

The height of the tree $= \frac{3 \times 14}{5} = 8.4$ m.

22 [a] The work rate of the machine

$= \frac{14 \text{ feddans}}{3.5 \text{ hr.}} = 4$ feddans/hr.

[b]

No. of feddans	14	?
Time in hours	3.5	5

The number of faddans $= \frac{5 \times 14}{3.5}$

= 20 feddans.

23 [a] $3x + 2 = \frac{4 \times 6}{3} = 8$

, then $3x = 8 - 2 = 6$ So , $x = \frac{6}{3} = 2$

[b] $x \times x = 4 \times 25 = 100$

, then $x = 10$

because 10 × 10 = 100



24 The rate of the first worker = $\frac{1 \text{ wall}}{4 \text{ hr.}}$ = $\frac{1}{4}$ wall / hr.

The rate of the second worker = $\frac{1 \text{ wall}}{2 \text{ hr.}}$ = $\frac{1}{2}$ wall / hr.

, then the rate of work if they are working together = $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$ wall / hr.

Wall	:	Number of hours
$\frac{3}{4}$	:	1
1	:	?

Number of hours = $\frac{1 \times 1}{\frac{3}{4}} = 1\frac{1}{3}$ hr. = 80 min.

Exercise 8

1

	The drawing distance	The real distance	The scale	Magnification or reduction
[a]	5 cm.	15 km.	1 : 300 000	Reduction
[b]	12 cm.	24 m.	1 : 200	Reduction
[c]	25 cm.	5 mm.	50 : 1	Magnification
[d]	4.8 dm.	16 km.	3 : 100 000	Reduction
[e]	10 cm.	40 km.	1 : 400 000	Reduction
[f]	9 cm.	2.1 mm.	300 : 7	Magnification
[g]	15 cm.	15 km.	1 : 100 000	Reduction
[h]	13 cm.	65 km.	1 : 500 000	Reduction

2 [a] $\frac{\text{Length in drawing}}{\text{Length in reality}}$ [b] 1 : 300

[c] 20 : 1 [d] 20 cm.

[e] 25 [f] 60

[g] reduction [h] magnification

[i] $\frac{\text{Length in drawing}}{\text{Drawing scale}}$

[j] drawing scale , real length.

[k] 1 : 1 500

3 [a] 1 : 1 000 [b] 1 : 400 [c] 150 : 1

[d] 9 : 100 000 [e] 0.9 [f] 1.5 m.

[g] 165 [h] 5 [i] 60 km.

[j] > [k] 50 : 1

4 The drawing scale =

length in drawing	:	length in reality
3	:	9 × 100 000
3	:	900 000 (÷ 3)
1	:	300 000

5 The drawing scale =

length in drawing	:	length in reality
8	:	40 × 100 000
8	:	4 000 000 (÷ 8)
1	:	500 000

6 The drawing scale =

length in drawing	:	length in reality
6	:	180 × 100
6	:	18 000 (÷ 6)
1	:	3 000

7 The ratio of enlargement =

length in drawing	:	length in reality
4.8 × 10	:	0.4
48	:	0.4 (× 10)
480	:	4 (÷ 4)
120	:	1

8 The drawing scale =

length in drawing	:	length in reality
0.027 × 1 000	:	3.75
27	:	3.75 (× 100)
2 700	:	375 (÷ 75)
36	:	5

9

Length in drawing	:	Length in reality
1	:	40
?	:	160

Osama's height in the picture = $\frac{160 \times 1}{40}$ = 4 cm.

10

Length in drawing	:	Length in reality
1	:	100
?	:	8

The length of the tree in the picture = $\frac{8 \times 1 \times 100}{100}$ = 8 cm.

11

Length in drawing	:	Length in reality
1	:	7 000
2.7	:	?

The real height of Cairo Tower = $\frac{7000 \times 2.7}{1}$ = 18 900 cm. = 189 m.

12

Length in drawing	:	Length in reality
1	:	300 000
14	:	?

The real distance between the two cities = $\frac{14 \times 300\,000}{1}$ = 4 200 000 cm. = 42 km.

13

Length in drawing	:	Length in reality
1	:	500 000
3	:	?

The real distance between the two cities = $\frac{500\,000 \times 3}{1}$ = 1 500 000 cm. = 15 km.

14

Length in drawing	:	Length in reality
1	:	200 000
5	:	?

The real distance between the two cities = $\frac{5 \times 200\,000}{1}$ = 1 000 000 cm. = 10 km.

15

Length in drawing	:	Length in reality
1	:	100 000
?	:	5

The length of the road on the map = $\frac{1 \times 5 \times 100\,000}{100\,000}$ = 5 cm.

16

Length in drawing	:	Length in reality
1	:	9 000 000
?	:	180

The distance between the two cities on the map = $\frac{1 \times 180 \times 100\,000}{9\,000\,000}$ = 2 cm.

17

Length in drawing	:	Length in reality
100	:	1
2.5	:	?

The real length of the insect = $\frac{1 \times 2.5}{100}$ = 0.025 cm. = 0.25 mm.

18

Length in drawing	:	Length in reality
1	:	1 000
3	:	?

The real height of the building = $\frac{3 \times 1\,000}{1}$ = 3 000 cm. = 30 m.

19

Length in drawing	:	Length in reality
3	:	500
3.6	:	?

The real side length of the garden = $\frac{500 \times 3.6}{3}$ = 600 cm. = 6 m.

20

Length in drawing	:	Length in reality
100	:	1
?	:	0.8

The length after magnification = $\frac{0.8 \times 100}{1}$ = 80 mm. = 8 cm.

21 The drawing scale =

length in drawing	:	length in reality
10	:	120 × 100 000
10	:	12 000 000 (÷ 10)
1	:	1 200 000

Length in drawing	:	Length in reality
1	:	1 200 000
6	:	?

The real distance between the two cities = $\frac{6 \times 1\,200\,000}{1}$ = 7 200 000 cm. = 72 km.

22 The drawing scale =

length in drawing	:	length in reality
5	:	10 × 100 000
5	:	1 000 000 (÷ 5)
1	:	200 000

Length in drawing : Length in reality
1 : 200 000
3 : ?

The real distance between the two cities $= \frac{3 \times 200\,000}{1} = 600\,000$ cm. = 6 km.

23 Length in drawing : Length in reality
300 : 1
? : 0.02

The length after magnification $= \frac{300 \times 0.02}{1}$ = 6 cm.

24 Length in drawing : Length in reality
1 : 500 000
6.8 : ?

The real distance between the two cities $= \frac{6.8 \times 500\,000}{1} = 3\,400\,000$ cm. = 34 km.

The drawing scale =
length in drawing : length in reality
4.25 : 34 × 100 000
4.25 : 3 400 000 (× 100)
425 : 340 000 000 (÷ 425)
1 : 800 000

25 The side length of the square in reality = 240 ÷ 4 = 60 m.

Length in drawing : Length in reality
1 : 200
? : 60

The side length of the square in the drawing $= \frac{1 \times 60}{200}$ = 0.3 m. = 30 cm.

26 Length in drawing : Length in reality
1 : 1 000
? : 50

The side length of the square in drawing $= \frac{1 \times 50}{1000}$ = 0.05 m = 5 cm.

The area of the square in drawing = 5 × 5 = 25 cm^2

27 [a] Length in drawing : Length in reality
1 : 200
20 : ?

The real length of the land $= \frac{20 \times 200}{1} = 4\,000$ cm. = 40 m.

[b] The real width of the land $= \frac{1\,200}{40}$ = 30 m.

28 Length in drawing : Length in reality
1 : 2 000
7.2 : ?

The first dimension in reality $= \frac{7.2 \times 2\,000}{1} = 14\,400$ cm. = 144 m.

Length in drawing : Length in reality
1 : 2 000
4.8 : ?

The second dimension in reality $= \frac{4.8 \times 2\,000}{1} = 9\,600$ cm. = 96 m.

The real area = 144 × 96 = 13 824 m^2

29 [a] The magnification ratio =
length in drawing : length in reality
5.4 × 10 : 9
54 : 9 (÷ 9)
6 : 1

[b] Length in drawing : Length in reality
6 : 1
x : 36

$x = \frac{36 \times 6}{1}$ = 216 mm. = 21.6 cm.

30 Length in drawing : Length in reality
1 : 40 000
10 : ?

The real distance $= \frac{10 \times 40\,000}{1}$ = 400 000 cm. = 4 km.

Length in drawing : Length in reality
1 : 100 000
? : 4

The distance between the two cities on the second map $= \frac{1 \times 4 \times 100\,000}{100\,000}$ = 4 cm.

Exercise 9

1 Hany : Ahmed : Sum
7 : 5 : 12
? : ? : 360

The share of Hany $= \frac{7 \times 360}{12}$ = 210 pounds.

The share of Ahmed $= \frac{5 \times 360}{12}$ = 150 pounds.

2 Hassan : Shaymaa : Sum
2 : 3 : 5
? : ? : 450

The share of Hassan $= \frac{2 \times 450}{5}$ = L.E. 180

The share of Shaymaa $= \frac{3 \times 450}{5}$ = L.E. 270

3 First : Second : Difference
7 : 5 : 2
? : ? : 80

The share of the first $= \frac{7 \times 80}{2} = 280$ m^2

The share of the second $= \frac{5 \times 80}{2} = 200$ m^2

The area of the land = 280 + 200 = 480 m^2

4 First : Second : Difference
3 : 5 : 2
? : ? : 30

The share of the first $= \frac{3 \times 30}{2}$ = L.E. 45

The share of the second $= \frac{5 \times 30}{2}$ = L.E. 75

5 1st son : 2nd son : 3rd son : Sum
1 : 2 : 5 : 8
? : ? : ? : 8 000

The share of the first son $= \frac{1 \times 8\,000}{8}$ = 1 000 pounds.

The share of the second son $= \frac{2 \times 8\,000}{8}$ = 2 000 pounds.

The share of the third son $= \frac{5 \times 8\,000}{8}$ = 5 000 pounds.

6 Samy : Nabil : Wael : Sum
3 : 4 : 5 : 12
? : ? : ? : 36 000

The profit of Samy $= \frac{3 \times 36\,000}{12}$ = L.E. 9 000

The profit of Nabil $= \frac{4 \times 36\,000}{12}$ = L.E. 12 000

The profit of Wael $= \frac{5 \times 36\,000}{12}$ = L.E. 15 000

7 A : B : C : B – C
6 : 4 : 3 : 1
? : ? : ? : 6

The production of A $= \frac{6 \times 6}{1}$ = 36 machines.

The production of B $= \frac{4 \times 6}{1}$ = 24 machines.

The production of C $= \frac{3 \times 6}{1}$ = 18 machines.

8 The share of the first son $= \frac{1}{3} \times 225$ = 75 pounds.

The rest = 225 – 75 = 150 pounds.

2nd : 3rd : Sum
2 : 3 : 5
? : ? : 150

The share of the second son $= \frac{2 \times 150}{5}$ = 60 pounds.

The share of the third son $= \frac{3 \times 150}{5}$ = 90 pounds.

9 The share of the first son $= \frac{1}{3} \times 6\,300$ = 2 100 pounds.

The rest = 6 300 – 2 100 = 4 200 pounds.

2nd : 3rd : Sum
3 : 2 : 5
? : ? : 4 200

The share of the second son $= \frac{3 \times 4\,200}{5}$ = 2 520 pounds.

The share of the third son $= \frac{2 \times 4\,200}{5}$ = 1 680 pounds.

10 1st side : 2nd side : 3rd side : Sum
3 : 4 : 5 : 12
? : ? : ? : 120

The length of the first side $= \frac{3 \times 120}{12}$ = 30 m.

The length of the second side = $\frac{4 \times 120}{12}$ = 40 m.

The length of the third side = $\frac{5 \times 120}{12}$ = 50 m.

11 1st person : 2nd person : 3rd person : Sum

50 000 : 40 000 : 30 000 : (÷ 10 000)

5 : 4 : 3 :

5 : 4 : 3 : 12

? : ? : ? : 36 000

The share of the first person

= $\frac{5 \times 36\,000}{12}$ = 15 000 pounds

The share of the second person

= $\frac{4 \times 36\,000}{12}$ = 12 000 pounds

The share of the third person

= $\frac{3 \times 36\,000}{12}$ = 9 000 pounds

12 1st person : 2nd person : 3rd person : Sum

9 000 : 5 400 : 7 200 : (÷ 100)

90 : 54 : 72 : (÷ 2)

45 : 27 : 36 : (÷ 3)

15 : 9 : 12 : (÷ 3)

5 : 3 : 4 : 12

? : ? : ? : 1 800

The profit of the first person = $\frac{5 \times 1\,800}{12}$ = L.E. 750

The profit of the second person = $\frac{3 \times 1\,800}{12}$ = L.E. 450

The profit of the third person = $\frac{4 \times 1\,800}{12}$ = L.E. 600

13 1st person : 2nd person : 3rd person : Sum

60 000 : 80 000 : 90 000 : (÷ 10 000)

6 : 8 : 9 : 23

? : ? : ? : 20 700

The profit of the first person

= $\frac{6 \times 20\,700}{23}$ = L.E. 5 400

The profit of the second person

= $\frac{8 \times 20\,700}{23}$ = L.E. 7 200

The profit of the third person

= $\frac{9 \times 20\,700}{23}$ = L.E. 8 100

14 Siham : Sherief : Magdy : (Sherief + Magdy)

5 000 : 3 000 : 4 000 : (÷ 1 000)

5 : 3 : 4 : 7

? : ? : ? : 1 610

The profit of Siham = $\frac{5 \times 1\,610}{7}$ = L.E. 1 150

The profit of Sherief = $\frac{3 \times 1\,610}{7}$ = L.E. 690

The profit of Magdy = $\frac{4 \times 1\,610}{7}$ = L.E. 920

15 Hani : Khaled : Fady : Sum

30 000 : 40 000 : 50 000: (÷ 10 000)

3 : 4 : 5 : 12

? : ? : ? : 6 000

The loss of Hani = $\frac{3 \times 6\,000}{12}$ = 1 500 pounds.

The loss of Khaled = $\frac{4 \times 6\,000}{12}$ = 2 000 pounds.

The loss of Fady = $\frac{5 \times 6\,000}{12}$ = 2 500 pounds.

16 1st : 2nd : 3rd : 1st – 2nd

6 000 : 4 800 : 7 200 : (÷ 100)

60 : 48 : 72 : (÷ 6)

10 : 8 : 12 : (÷ 2)

5 : 4 : 6 : 1

? : ? : ? : 240

The profit of the second = $\frac{4 \times 240}{1}$ = L.E. 960

The profit of the third = $\frac{6 \times 240}{1}$ = L.E. 1 440

17 What the third paid = 30 000 × 2 = L.E. 60 000

First : Second : Third : Sum

30 000 : 35 000 : 60 000 : (÷ 1000)

30 : 35 : 60 : (÷ 5)

6 : 7 : 12 : 25

? : ? : ? : 25 000

The profit of the first = $\frac{6 \times 25\,000}{25}$ = L.E. 6 000

The profit of the second = $\frac{7 \times 25\,000}{25}$ = L.E. 7 000

The profit of the third = $\frac{12 \times 25\,000}{25}$ = L.E. 12 000

18 The third paid = $\frac{1}{2}$ (30 000 + 24 000) = L.E. 27 000

First : Second : Third : Sum

30 000 : 24 000 : 27 000 : (÷ 1000)

30 : 24 : 27 : (÷ 3)

10 : 8 : 9 : 27

? : ? : ? : 2 700

The profit of the first = $\frac{10 \times 2\,700}{27}$ = L.E. 1 000

The profit of the second = $\frac{8 \times 2\,700}{27}$ = L.E. 800

The profit of the third = $\frac{9 \times 2\,700}{27}$ = L.E. 900

19 First : Second : Third : Sum

35 000 : 25 000 : 20 000 : (÷ 1 000)

35 : 25 : 20 : (÷ 5)

7 : 5 : 4 : 16

? : ? : ? : 16 000

The loss share of the first = $\frac{7 \times 16\,000}{16}$ = L.E. 7 000

The capital of the first in the 2nd year = 35 000 – 7 000 = L.E. 28 000

The loss share of the second = $\frac{5 \times 16\,000}{16}$ = L.E. 5000

The capital of the second in the 2nd year = 25 000 – 5 000 = L.E. 20 000

The loss share of the third = $\frac{4 \times 16\,000}{16}$ = L.E. 4 000

The capital of the third in the 2nd year = 20 000 – 4 000 = L.E. 16 000

20 m (∠ A) : m (∠ B) : m (∠ C) : Sum

[2 / 1] : 3 : :

: : 2 :

2 : 3 : 4 : 9

? : ? : ? : 180°

The measure of ∠ A = $\frac{2 \times 180°}{9}$ = 40°

The measure of ∠ B = $\frac{3 \times 180°}{9}$ = 60°

The measure of ∠ C = $\frac{4 \times 180°}{9}$ = 80°

21 1st class : 2nd class : 3rd class : Sum

2 : [3 / 4] : :

: : 5 :

8 : 12 : 15 : 35

? : ? : ? : 700

The number of passengers in the first class

= $\frac{8 \times 700}{35}$ = 160 passengers.

The number of passengers in the second class = $\frac{12 \times 700}{35}$ = 240 passengers.

The number of passengers in the third class

= $\frac{15 \times 700}{35}$ = 300 passengers.

22 1st class : 2nd class : 3rd class : Sum

2 : [3 / 5] : :

: : 7 :

10 : 15 : 21 : 46

? : ? : ? : 92

The number of learners in the first class

= $\frac{10 \times 92}{46}$ = 20 learners.

The number of learners in the second class

= $\frac{15 \times 92}{46}$ = 30 learners.

The number of learners in the third class

= $\frac{21 \times 92}{46}$ = 42 learners.

23 1st merchant : 2nd merchant : 3rd merchant : Sum

2 : [3 / 4] : :

: : 5 :

8 : 12 : 15 : 35

? : ? : ? : 280

The share of the first merchant

= $\frac{8 \times 280}{35}$ = 64 kg.

The share of the second merchant

= $\frac{12 \times 280}{35}$ = 96 kg.

The share of the third merchant

= $\frac{15 \times 280}{35}$ = 120 kg.

24

1st person	2nd person	3rd person	Sum
2	3		
1		2	
2	3	4	9
?	?	?	3 600

The profit of the first person $= \frac{2 \times 3\,600}{9} =$ L.E. 800

The profit of the second person $= \frac{3 \times 3\,600}{9} =$ L.E. 1 200

The profit of the third person $= \frac{4 \times 3\,600}{9} =$ L.E. 1 600

25

1st person	2nd person	3rd person
2	3	
	5	4
10	15	12
240	?	–

The share of the second person $= \frac{15 \times 240}{10} =$ L.E. 360

26

Hashem	Metwally	Hamed	Hamed – Metwally
3	5		
	1	3	
3	5	15	10
?	?	?	150

The profit of Hashem $= \frac{3 \times 150}{10} =$ L.E. 45

The profit of Metwally $= \frac{5 \times 150}{10} =$ L.E. 75

The profit of Hamed $= \frac{15 \times 150}{10} =$ L.E. 225

27 The profit of the first without that for management = 3 000 – 750 = L.E. 2 250

1st	2nd	3rd	
5		6	
	7	9	
45	42	54	(÷ 3)
15	14	18	
2 250	?	?	

The profit of the second $= \frac{14 \times 2\,250}{15}$ = L.E. 2 100

The profit of the third $= \frac{18 \times 2\,250}{15}$ = L.E. 2 700

28 What the third paid $= \frac{1}{3} \times (350\,000 + 250\,000)$ = 200 000 pounds

1st person	2nd person	3rd person	Sum
350 000	250 000	200 000	(÷ 10 000)
35	25	20	(÷ 5)
7	5	4	16
?	?	?	160 000

The share of the first person $= \frac{7 \times 160\,000}{16}$ = 70 000 pounds.

The share of the second person $= \frac{5 \times 160\,000}{16}$ = 50 000 pounds.

The share of the third person $= \frac{4 \times 160\,000}{16}$ = 40 000 pounds.

The capital of the first person = 350 000 – 70 000 = 280 000 pounds.

The capital of the second person = 250 000 – 50 000 = 200 000 pounds.

The capital of the third person = 200 000 – 40 000 = 160 000 pounds.

29 The profit of A for his management $= \frac{1}{10} \times 120\,000$ = L.E. 12 000

The rest of the profit = L.E. 108 000

A	B	C	Sum
6	7	5	18
?	?	?	108 000

The profit of A $= \frac{6 \times 108\,000}{18}$ = L.E. 36 000

The total profit of A = 12 000 + 36 000 = L.E. 48 000

The profit of B $= \frac{7 \times 108\,000}{18}$ = L.E. 42 000

The profit of C $= \frac{5 \times 108\,000}{18}$ = L.E. 30 000

30 The area of the school $= \frac{1}{2} \times 48$ = 24 kirats.

The rest area = 48 – 24 = 24 kirats.

If the share of the daughter = 1 part.

, then the share of the son = 2 parts.

The total number of parts of 2 sons and 2 daughters = (2 × 2) + (2 × 1) = 4 + 2 = 6 parts.

The value of each part = 24 ÷ 6 = 4 kirats.

The share of each daughter = 4 kirats.

The share of each son = 4 × 2 = 8 kirats.

31 The wife share $= \frac{1}{8} \times 24\,000$ = 3 000 pounds.

The children share = 24 000 – 3 000 = 21 000 pounds.

The total number of parts of 2 boys and a girl = (2 × 2) + 1 = 4 + 1 = 5 parts.

The value of each part = 21 000 ÷ 5 = 4 200 pounds.

The share of each boy = 4 200 × 2 = 8 400 pounds.

The share of the girl = 4 200 pounds.

32 The wife share $= \frac{1}{8} \times 48\,000$ = L.E. 6 000

The children share = 48 000 – 6 000 = L.E. 42 000

The total number of parts of 3 sons and 4 daughters = (3 × 2) + (4 × 1) = 6 + 4 = 10 parts.

The value of each part = 42 000 ÷ 10 = L.E. 4 200

The share of each son = 4 200 × 2 = L.E. 8 400

The share of each daughter = L.E. 4 200

33 [a] The tax $= \frac{1}{4} \times 4\,900$ = L.E. 1 225

The reservation $= \frac{3}{7} \times 4\,900$ = L.E. 2 100

The rest of profit = 4 900 – (1 225 + 2 100) = L.E. 1 575

[b]

Ayman	Mostafa	Kamal	Sum
6 000	8 000	14 000	(÷ 1000)
6	8	14	(÷ 2)
3	4	7	14
?	?	?	1 575

The share of Ayman $= \frac{3 \times 1\,575}{14}$ = L.E. 337.5

The share of Mostafa $= \frac{4 \times 1\,575}{14}$ = L.E. 450

The share of Kamal $= \frac{7 \times 1\,575}{14}$ = L.E. 787.5

34

Ahmed	Ali	Fady	Sum
12	8	6	(÷ 2)
6	4	3	13
?	?	?	74 880

The profit of Ahmed $= \frac{6 \times 74\,880}{13}$ = L.E. 34 560

The profit of Ali $= \frac{4 \times 74\,880}{13}$ = L.E. 23 040

The profit of Fady $= \frac{3 \times 74\,880}{13}$ = L.E. 17 280

35 If the share of a girl = 2 parts.

, then the share of a boy = 3 parts.

The total number of parts of 5 boys and 9 girls = (5 × 3) + (9 × 2) = 33 parts.

The value of each part $= \frac{132}{33}$ = 4 pieces.

, the share of each boy = 3 × 4 = 12 pieces.

and the share of each girl = 2 × 4 = 8 pieces.

Exercise 10

1 [a] $\frac{1}{50}$ [b] $\frac{12}{25}$ [c] $\frac{7}{10}$ [d] $\frac{63}{100}$ [e] $\frac{3}{4}$ [f] $\frac{21}{200}$ [g] $\frac{3}{8}$ [h] $\frac{1}{3}$

2 [a] 62.5 % [b] 60 % [c] 6.5 % [d] 52 % [e] $66\frac{2}{3}$ %

3 [a] 40 % [b] 40.5 % [c] 6 % [d] 25.14 % [e] 3.75 %

4 [a] 0.056 [b] 0.455 [c] 0.0002 [d] 0.4325 [e] 0.375

5 [a] its second term is 100 [b] 75 [c] 82.5 [d] 5 [e] 43 % [f] 20 % [g] 100 [h]17 % [i] 22 [j] 80 [k] 100 [l] 1 [m] 0.4 [n] 0 [o] 25 [p] 3 [q] 100 [r] 92

6 [a] 69 [b] 90 [c] 25 [d] 4 800 [e] 500 [f] 60 [g] 800 [h] 25 [i] 20 [j] 480 [k] 500



7 [a] $\frac{x}{9} = \frac{15}{100}$ $x = \frac{9 \times 15}{100} = 1.35$

[b] $\frac{x}{12} = \frac{36}{100}$ $x = \frac{12 \times 36}{100} = 4.32$

[c] $\frac{2}{x+8} = \frac{5}{100}$ $x + 8 = \frac{2 \times 100}{5} = 40$

$x = 40 - 8 = 32$

[d] $\frac{x+6}{20} = \frac{50}{100}$ $x + 6 = \frac{50 \times 20}{100} = 10$

$x = 10 - 6 = 4$

[e] $\frac{x-2}{100} = \frac{25}{100}$ $x - 2 = \frac{100 \times 25}{100} = 25$

$x = 25 + 2 = 27$

[f] $\frac{3x}{2} = \frac{75}{100}$ $3x = \frac{2 \times 75}{100} = 1.5$

$x = 1.5 + 3 = 0.5$

8 [a] 175 [b] 125 [c] 0.5
[d] 0.7 [e] $\frac{3}{4}$ [f] 55
[g] 80 [h] 8 [i] 450
[j] 1 : 3 [k] 0.45 [l] 3
[m] its three tenths [n] 500

9 $\frac{65}{100} \times 44 = 28.6$, $\frac{44}{100} \times 65 = 28.6$

Then 65 % of 44 = 44 % of 65

10 The percentage of the number of boys
= 100 % – 67 % = 33 %

11 The percentage of the failures
= 100 % – 85 % = 15 %

The percentage of succeeded pupils in the simplest form = $\frac{17}{20}$

The percentage of failures pupils in the simplest form = $\frac{3}{20}$

12 The percentage of cotton = 100 % – 40 %
= 60 %

The equivalent fraction to the percentage of synthetic = $\frac{2}{5}$

The equivalent fraction to the percentage of cotton = $\frac{3}{5}$

13 The percentage of the marks he got
= $\frac{18}{20} \times 100\ \% = 90\ \%$

14 The percentage of the participant pupils
= $\frac{12}{35} \times 100\ \% = 34\frac{2}{7}\ \%$

15 The percentage of absentees
= $\frac{15}{750} \times 100\ \% = 2\ \%$

16 The percentage of oranges
= $\frac{32}{50} \times 100\ \% = 64\ \%$

17 The weight of the pure gold in the alloy
= 70 – 7 = 63 gm.

The percentage of the pure gold in the alloy
= $\frac{63}{70} \times 100\ \% = 90\ \%$

18 The percentage of the number of pieces that Hassan ate = $\frac{3}{24} \times 100\ \% = 12.5\ \%$

The percentage of the number of pieces eaten by his family = $\frac{6}{24} \times 100\ \% = 25\ \%$

19 The percentage of savings = $\frac{429}{2\,860} \times 100\ \%$
= 15 %

The percentage of expenditure
= 100 % – 15 % = 85 %

20 The number of succeeded pupils
= 300 – 60 = 240 pupils.

The percentage of succeeded pupils
= $\frac{240}{300} \times 100\ \% = 80\ \%$

21 The increase = 920 – 800 = 120 piastres.

The percentage of increase = $\frac{120}{800} \times 100\ \%$
= 15 %

22 Hatem's score = 80 % × 60
= $\frac{80}{100} \times 60 = 48$ marks.

Hatem has got a better score

The difference between their scores
= 48 – 45 = 3 marks.

23 The number of persons who did not give answer = 427 – (224 + 154) = 49 persons.

Their percentage = $\frac{49}{427} \times 100\ \% = 11\frac{29}{61}\ \%$
= 11.5 %

24 What Wael paid = $\frac{30}{100} \times 60\,000$ = L.E. 18 000

25 [a] The percentage of the occupied seats
= $\frac{48}{60} \times 100\ \% = 80\ \%$

[b] The percentage of the non-occupied seats
= 100 % – 80 % = 20 %

26 The percentage of pupils in the first grade
= $\frac{420}{1\,050} \times 100\ \% = 40\ \%$

The percentage of pupils in the second grade
= $\frac{350}{1\,050} \times 100\ \% = 33\frac{1}{3}\ \%$

The percentage of pupils is the third grade
= $100\ \% - (40\ \% + 33\frac{1}{3}\ \%) = 26\frac{2}{3}\ \%$

27 [a] The percentage of the increase in the 1st year
= $\frac{90}{450} \times 100\ \% = 20\ \%$

[b] The percentage of the increase in the 2nd year
= $\frac{45}{450 + 90} \times 100\ \% = \frac{45}{540} \times 100\ \%$
= $8\frac{1}{3}\ \%$

28 The percentage of the paved kilometres in the 3rd month
= 100 % – (45 % + 25 %) = 30 %

The paved distance in the 3rd month
= $\frac{30}{100} \times 520 = 156$ km.

29 The percentage of those who failed
= 100 % – 86 % = 14 %

The number of pupils who failed
= $\frac{14}{100} \times 650 = 91$ pupils.

30 The percentage of failed pupils
= 100% – 91 % = 9 %

The number of all pupils = $18 \times \frac{100}{9}$
= 200 pupils.

The number of succeeded pupils
= 200 – 18 = 182 pupils.

31 The percentage of the saving
= 100 % – (35 % + 50 %) = 15 %

What the family saves monthly
= 15 % × 840 = L.E. 126

32 The percentage of the remaind notebooks
= 100 % – 25 % = 75 %

The total number of notebooks = $60 \times \frac{100}{75}$
= 80 notebooks.

33 The total number of the flowers in the vase
= $18 \times \frac{100}{30} = 60$ flowers.

The number of jasmine flowers
= 60 × 45 % = 27 flowers.

The number of violet flowers
= 60 – (18 + 27) = 15 flowers.

34 $\frac{13}{100}$ × (sum of the two amounts of money)
= L.E. 117

The sum of the two amounts of money
= $117 \times \frac{100}{13}$ = L.E. 900

First	:	Second	:	Sum
2	:	3	:	5
?	:	?	:	900

The first amount = $\frac{2 \times 900}{5}$ = L.E. 360

The second amount = $\frac{3 \times 900}{5}$ = L.E. 540

35

Distance	:	Time
25 %	:	10
100 %	:	?

The total time needed to cover all the track = $\frac{10 \times 100\ \%}{25\ \%}$ = 40 minutes.

36 The number of succeeded students
= $\frac{85}{100} \times 800 = 680$ students.

Boys	: Girls	: Sum
2	: 3	: 5
	: ?	: 680

The number of succeeded girls
= $\frac{680 \times 3}{5} = 408$ girls.

Exercise 11

1 The profit = 130 000 – 100 000 = L.E. 30 000

The percentage of the profit
= $\frac{30\,000}{100\,000} \times 100\ \% = 30\ \%$

Answers of the main book

2 The loss = 2 000 – 1 800 = L.E. 200
The percentage of the loss
$= \frac{200}{2\,000} \times 100\ \% = 10\ \%$

3 The loss = 720 – 630 = L.E. 90
The percentage of the loss
$= \frac{90}{720} \times 100\ \% = 12\frac{1}{2}\ \%$

4 The cost price = 4 500 + 500 = L.E. 5 000
The profit = 6 250 – 5 000 = L.E. 1 250
The percentage of the profit
$= \frac{1\,250}{5\,000} \times 100\ \% = 25\ \%$

5 The cost price = 49 000 + 1 000 = L.E. 50 000
The profit = 55 000 – 50 000 = L.E. 5 000
The percentage of the profit
$= \frac{5\,000}{50\,000} \times 100\ \% = 10\ \%$

6 C.P. : Profit : S.P.
100 % : 6 % : 106 %
? : : 3 180
The cost price $= \frac{3\,180 \times 100\ \%}{106\ \%}$ = L.E. 3 000

7 C.P. : Profit : S.P.
100 % : 12 % : 112 %
? : : 2 100
The cost price $= \frac{2\,100 \times 100\ \%}{112\ \%}$ = L.E. 1 875

8 C.P. : Loss : S.P.
100 % : 10 % : 90 %
: ? : 10 800
The loss $= \frac{10\,800 \times 10\ \%}{90\ \%}$ = L.E. 1 200

9 C.P. : Profit : S.P.
100 % : 15 % : 115 %
? : ? : 21 520
The buying price $= \frac{21\,520 \times 100\ \%}{115\ \%}$
= L.E. 18 713
The profit $= \frac{21\,520 \times 15\ \%}{115\ \%}$ = L.E. 2 807

10 C.P. : Loss : S.P.
100 % : 5 % : 95 %
150 000 : : ?
The selling price $= \frac{150\,000 \times 95\ \%}{100\ \%}$
= L.E. 142 500

11 The cost price = 5 480 + 1 020 = L.E. 6 500
C.P. : Loss : S.P.
100 % : 6 % : 94 %
6 500 : : ?
The selling price $= \frac{6\,500 \times 94\ \%}{100\ \%}$ = L.E. 6 110

12 C.P. : Profit : S.P.
100 % : 12.5 % : 112.5 %
? : 105 : ?
The cost price $= \frac{105 \times 100\ \%}{12.5\ \%}$ = L.E. 840
The selling price $= \frac{105 \times 112.5\ \%}{12.5\ \%}$ = L.E. 945

13 C.P. : Profit : S.P.
100 % : 22.5 % : 122.5 %
: 1 800 : ?
The selling price $= \frac{1\,800 \times 122.5\ \%}{22.5\ \%}$ = L.E. 9 800

14 C.P. : Loss : S.P.
100 % : 4.5 % : 95.5 %
? : 562.5 :
The buying price $= \frac{562.5 \times 100\ \%}{4.5\ \%}$
= L.E. 12 500

15 The discount = 2 500 – 2 350 = L.E. 150
The percentage of the discount
$= \frac{150}{2\,500} \times 100\ \% = 6\ \%$

16 Price before discount : Discount : Price after discount
100 % : 20 % : 80 %
? : : 12
The price before discount $= \frac{12 \times 100\ \%}{80\ \%}$
= L.E. 15

17 Price before discount : Discount : Price after discount
100 % : 10 % : 90 %
? : : 3 600
The price before discount $= \frac{3\,600 \times 100\ \%}{90\ \%}$
= L.E. 4 000

18 Price before discount : Discount : Price after discount
100 % : 20 % : 80 %
240 : : ?
The price after discount $= \frac{240 \times 80\ \%}{100\ \%}$
= L.E. 192

19 Before shrinking : Shrinking : After shrinking
100 % : 4 % : 96 %
20 : : ?
The length after shrinking $= \frac{20 \times 96\ \%}{100\ \%}$
= 19.2 m.

20 Before interest : Interest : After interest
100 % : 8 % : 108 %
20 000 : : ?
The total amount at the end of one year
$= \frac{20\,000 \times 108\ \%}{100\ \%}$ = L.E. 21 600

21 The tax $= \frac{10}{100} \times 900$ = L.E. 90
The total cost of the fridge = 900 + 90
= L.E. 990

22

	Original price	Percentage of the discount	Discount	Price after the discount
[a]	3 000	12 %	360	2 640
[b]	224	$14\frac{2}{7}$ %	32	192
[c]	450	10 %	45	405
[d]	560	10 %	56	504
[e]	$433\frac{1}{3}$	15 %	65	$368\frac{1}{3}$
[f]	3 000	5 %	150	2 850

23

	Item	Cost price	Selling price	Profit	Percentage of the profit
[a]	TV	1 800	2 000	200	$11\frac{1}{9}$ %
[b]	Computer	4 800	5 800	1 000	$20\frac{5}{6}$ %
[c]	Refrigerator	2 400	2 688	288	12 %
[d]	Washing machine	2 925	3 100	175	$5\frac{115}{117}$ %
[e]	Video	4 000	4 600	600	15 %

24

	Cost price	Selling price	Loss	Precentage of loss
[a]	7 200	6 600	600	$8\frac{1}{3}$ %
[b]	5 400	4 752	648	12 %
[c]	9 600	8 800	800	$8\frac{1}{3}$ %
[d]	10 000	9 000	1 000	10 %

25 The price before discount
= 130 + 250 = L.E. 380
Price before discount : Discount : Price after discount
100 % : 10 % : 90 %
380 : : ?
The price after discount $= \frac{380 \times 90\ \%}{100\ \%}$
= L.E. 342

26 **The first offer :**
Price before discount : Discount : Price after discount
100 % : 20 % : 80 %
160 : : ?
The price after discount $= \frac{160 \times 80\ \%}{100\ \%}$
= L.E. 128

The second offer :
Price before discount : Discount : Price after discount
100 % : 15 % : 85 %
140 : : ?
The price after discount $= \frac{140 \times 85\ \%}{100\ \%}$
= L.E. 119

The second offer is better.

27 The price of 6 milk boxes before discount
= 5 × 6 = L.E. 30
Price before discount : Discount : Price after discount
100 % : 15 % : 85 %
30 : : ?
The price of 6 milk boxes after discount
$= \frac{30 \times 85\ \%}{100\ \%}$ = L.E. 25.5
* The saved money = 30 – 25.5 = L.E. 4.5
i.e. is not enough to buy any boxes of milk.

28 C.P. of house : Loss : S.P. of house
100 % : 15 % : 85 %
75 000 : : ?

The selling price of the house $= \frac{75\,000 \times 85\ \%}{100\ \%} =$ L.E. 63 750

C.P. of farm : Profit : S.P. of farm
100 % : 25 % : 125 %
100 000 : : ?

The selling price of the farm $= \frac{100\,000 \times 125\ \%}{100\ \%} =$ L.E. 125 000

The cost price of house and farm
= 75 000 + 100 000 = L.E. 175 000

The selling price of house and farm
= 63 750 + 125 000 = L.E. 188 750

The net profit = 188 750 – 175 000
= L.E. 13 750

29 C.P. : Profit : S.P.
100 % : 15 % : 115 %
? : : 92 000

The cost price $= \frac{92\,000 \times 100\ \%}{115\ \%}$
= L.E. 80 000

The buying price = 80 000 – 22 400
= L.E. 57 600

30 (buying price + storing expenses) : Profit : S.P.
100 % : 6 % : 106 %
? : : 21 624

The buying price and the storing expenses $= \frac{21\,624 \times 100\ \%}{106\ \%} =$ L.E. 20 400

The storing expenses = 20 400 – 20 000
= L.E. 400

31 Price before discount : Discount : Price after discount
100 % : 4 % : 96 %
5 000 : : ?

The selling price after discount $= \frac{5\,000 \times 96\ \%}{100\ \%} =$ L.E. 4 800

C.P. : Profit : S.P.
100 % : 20 % : 120 %
? : : 4 800

The cost price $= \frac{4\,800 \times 100\ \%}{120\ \%} =$ L.E. 4 000

32 C.P. : Loss : S.P.
100 % : 8 % : 92 %
? : : 1 656

The cost price $= \frac{1\,656 \times 100\ \%}{92\ \%} =$ L.E. 1 800

The profit = 12 % × 1 800 = L.E. 216

The selling price that makes the seller get a profit 12 %
= 1 800 + 216 = L.E. 2 016

33 The loss of the first car = 10 % × 50 000
= L.E. 5 000

The profit of the second car = 8 % × 75 500
= L.E. 6 040

Since the profit of the second car is greater than the loss of the first car.

So , the result of the two deals is profit.

The profit = 6 040 – 5 000 = L.E. 1 040

34 The reducing money = 20 % × 2 000
= 400 pounds.

The new price = 2 000 – 400 = 1 600 pounds.

The percentage of increasing
$= \frac{400}{1\,600} \times 100\ \% = 25\ \%$

35 The buying price = 35 × 40 = L.E. 1 400

The buying price of the part which is sold with profit $= \frac{80}{100} \times 1\,400 =$ L.E. 1 120

C.P. : Profit : S.P.
100 % : 20 % : 120 %
1 120 : : ?

The selling price of this part $= \frac{120\ \% \times 1\,120}{100\ \%}$
= L.E. 1 344

The buying price of the second part
= 1 400 – 1 120 = L.E. 280

C.P. : Loss : S.P.
100 % : 24 % : 76 %
280 : : ?

The selling price of the second part
$= \frac{76\ \% \times 280}{100\ \%} =$ L.E. 212.8

The total selling price = 1 344 + 212.8
= L.E. 1556.8

, then the merchant gained and his profit = 1556.8 – 1 400 = L.E. 156.8

The percentage of profit $= \frac{156.8}{1\,400} \times 100\ \%$
= 11.2 %

Answers of unit test

1 [a] 12 [b] 165 [c] 55
[d] 18 [e] 1.35

2 [a] 22 % [b] 13 [c] 1 : 300
[d] 4 [e] reduction

3
[a] The percentage of who failed
= 100 % – 85 % = 15 %

The number of pupils who failed
$= \frac{15}{100} \times 3\,700 = 555$ pupils

[b] Price before discount : Discount : Price after discount
100 % : 5 % : 95 %
? : : 4 275

The price before discount $= \frac{4\,275 \times 100\ \%}{95\ \%}$
= L.E. 4 500

4
[a] The ratio of enlargement =

length in drawing	:	length in reality
4.8 × 10	:	0.4
48	:	0.4 (× 10)
480	:	4 (÷ 4)
120	:	1

[b] The loss = 7 600 – 6 080 = L.E. 1 520

The percentage of the loss $= \frac{1\,520}{7\,600} \times 100\ \%$
= 20 %

5
[a]

Height	85	?
Shade length	34	17

The height of the tree $= \frac{85 \times 17}{34} = 42.5$ m.

[b] The share of the first son
$= \frac{1}{3} \times 6\,300 = 2\,100$ pounds

The rest = 6 300 – 2 100 = 4 200 pounds

2^{nd} : 3^{rd} : Sum
3 : 2 : 5
? : ? : 4 200

The share of the second son $= \frac{3 \times 4\,200}{5}$
= 2 520 pounds

The share of the third son $= \frac{2 \times 4\,200}{5}$
= 1 680 pounds



Unit Three

Exercise 12

1 [a] rhombus , square
[b] rectangle , square
[c] rhombus , square
[d] rectangle , square
[e] parallelogram , rectangle , rhombus , square
[f] parallelogram , rectangle , rhombus , square
[g] parallelogram , rectangle , rhombus , square

2 [a] bisect each other [b] 180°
[c] parallel , equal in length [d] 60°
[e] 110° [f] perpendicular
[g] one of its angles is right [h] a square
[i] its diagonals [j] a rectangle
[k] a square

3 [a] square [b] equal in length
[c] perpendicular and equal in length
[d] rectangle [e] rhombus
[f] rectangle [g] a rhombus
[h] 120° [i] 180° [j] 50
[k] 9 [l] 18 [m] 5

4 (1) Since m (∠ DAB) + m (∠ ABC) = 180°
«Two consecutive angles»
, then m (∠ ABC) = 180° – 53° = 127°
(2) AD = BC = 8 cm.
, DC = AB = 5 cm.

5 (1) [a] m (∠ D) = 120° [b] m (∠ A) = 60°
(2) [a] $\overline{BC}$ [b] 12

6 (1) m (∠ XLZ) = m (∠ XYZ) = 120°
"Two opposite angles in the parallelogram"
(2) Since ZM = $\frac{1}{2}$ XZ
"Two diagonals bisect each other"
, then XZ = 2 × ZM = 2 × 3.5 = 7 cm.
Since LZ = XY , XL = YZ
"Two opposite sides"
, then LZ = 3 cm. , XL = 5 cm.
The perimeter of the triangle XLZ
= 7 + 3 + 5 = 15 cm.

7 (1) m (∠ L) = m (∠ Y) = 118°
«Two opposite angles in the parallelogram»
(2) m (∠ XYZ) + m (∠ YXL) = 180°
«Two consecutive angles in the parallelogram»
, then m (∠ YXL) = 180° –118° = 62°
, then m (∠ LXZ) = 62° – 27° = 35°

8 (1) Since m (∠ A) = m (∠ C)
«Two opposite angles»
, then m (∠ A) = 60°
(2) Since m (∠ ADC) + m (∠ C) = 180°
"Two consecutive angles"
, then m (∠ ADC) = 180° – 60° = 120°
, then m (∠ ADB) = 120° – 80° = 40°

9 (1) m (∠ D) = m (∠ B) = 110°
«Two opposite angles in the parallelogram»
(2) m (∠ BAD) + m (∠ ABC) = 180°
«Two consecutive angles in the parallelogram»
, then m (∠ BAD) = 180° – 110° = 70°
, then m (∠ BAC) = m (∠ BAD) – m (∠ CAD)
= 70° – 30° = 40°
(3) In Δ ACD :
m (∠ ACD) + m (∠ ADC) + m (∠ CAD) = 180°
, then m (∠ ACD) = 180° – (30° + 110°) = 40°

10 (1) m (∠ A) = m (∠ C) = 60°
«Two opposite angles»
In Δ ABD : m (∠ ABD) = 180° – (60° + 60°)
= 60°
(2) Equilateral triangle.
(3) The perimeter of the shape ABCD
= 5 + 5 + 5 + 5 = 20 cm.

11 (1) The perimeter = 8 × 4 = 32 cm.
(2) Since m (∠ ABC) + m (∠ BCD) = 180°
"Two consecutive angles"
, then m (∠ ABC) = 180° – 70° = 110°

12 (1) m (∠ B) = m (∠ ADC) = 60°
«Two opposite angles in the rhombus»
(2) m (∠ A) + m (∠ B) = 180°
"Two consecutive angles"
, then m (∠ A) = 180° – 60° = 120°
(3) CD = 4 cm.
Since the triangle DCE is equilateral
, then EC = CD = 4 cm.
and BE = BC + EC = 4 + 4 = 8 cm.
(4) The perimeter of the trapezium ABED
= 4 + 8 + 4 + 4 = 20 cm.

13 (1) Since m (∠ A) = m (∠ C)
«Two opposite angles»
, then 2 x = 60 , x = 60 ÷ 2 , x = 30°
Since m (∠ C) + m (∠ D) = 180°
"Two consecutive angles"
, then m (∠ D) = 180° – 60° = 120°
y + 80° = 120° y = 120° – 80°
y = 40°
(2) The perimeter of the parallelogram ABCD
= (7 + 5) × 2 = 24 cm.

14 [a] BC = 5 cm. , CD = 3 cm. ,
m (∠ A) = 110° , m (∠ D) = 70°
[b] AM = 4 cm. , BD = 14 cm.
[c] m (∠ Y) = 105°
[d] AB = 2 cm. , DM = 3 cm.
, the perimeter of Δ ABM = 8 cm.
[e] AD = 5 cm. , m (∠ BAM) = 60°
[f] The perimeter of the square ABCD = 16 cm.
, m (∠ DCE) = 65° , m (∠ CEB) = 65°

15 Fig. (1) :
AB = CD = 10 cm.
«Two opposite sides in the parallelogram»
, then 2 x = 10
x = 10 ÷ 2 = 5
Fig. (2) :
BD = AC = 6 cm.
"Two diagonals in the rectangle"
DM = $\frac{1}{2}$ BD
«Two diagonals bisect each other in the rectangle»
, then x = $\frac{1}{2}$ × 6 = 3
Fig. (3) :
CD = BC = 7 cm. «property of the square»
, then x + 2 = 7 x = 5
Fig. (4) :
AB = BC = 9 cm. «property of the rhombus»
, then 3 x = 9 x = 3

16 (1) The parallelograms are : ABCD , DFLC and HFNC
(2) The triangles are : AFD , FNL and DHC
(3) The figure ALCD is a trapezium.

17 (1) The length of $\overline{BF}$ = 7 – 4 = 3 cm.
Since the figure ABFE is a rectangle
, then the area of the rectangle ABFE
= 4 × 3 = 12 cm²
(2) EBCD is a trapezium
The length of $\overline{DE}$ = 7 – 3 = 4 cm.
The perimeter of the trapezium EBCD
= 5 + 7 + 4 + 4 = 20 cm.

18 , AB = DX = 4 cm.
, AD = BX = 7 cm.
, The perimeter of the rest of the figure
= 3 + 4 + 5 = 12 cm.

19 (1) m (∠ BEC) = 90°
, BE = 4 cm.
(2) The area of the figure ABCD
= the area of the rectangle ABED
+ the area of the triangle BEC
= 4 × 6 + $\frac{1}{2}$ × 3 × 4 = 30 cm²

20 [a] 12 cm.
[b] isosceles

21 [a] a rhombus , all of its sides are equal in length.
[b] a trapezium , there are two opposite parallel sides only.
[c] a parallelogram , each two opposite sides are equal in length.



Answers of the main book

[d] isosceles , there are two equal sides in length.

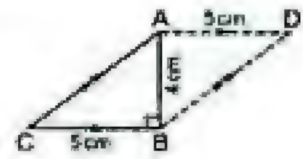
32 [a] (1) Put the point A on the side $\overline{XL}$ such that AX = 5 cm.

(2) Put the point B on the side $\overline{YZ}$ such that BY = 5 cm.

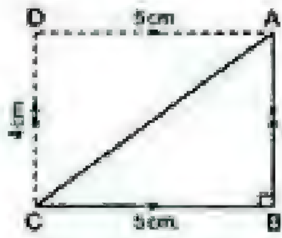
(3) Join the point A to the point B , we will get the square ABYX

[b] The square ABYX , the rectangle ABZL and the rectangle XYZL

33 [a]



[b]



34

1st angle	:	2nd angle	:	Sum
4	:	5	:	9
?	:	?	:	180

The measure of 1st angle = $\frac{4 \times 180}{9} = 80°$

The measure of 2nd angle = $\frac{5 \times 180}{9} = 100°$

35 (1) Rhombus (2) Rectangle
(3) Parallelogram (4) Square

36 [a] 50° [b] 105° [c] 5
[d] 16 [e] 5.5

37 In the parallelogram ABCD
m (∠ ABC) = m (∠ ADC) = 110° «Two opposite angles»
In the parallelogram HBCO
m (∠ HBC) = m (∠O) = 60° «Two opposite angles»
m (∠ ABH) = 110° – 60° = 50°

Exercise 13

1 [a] !!?? !!??
[b]
[c]
[d]
[e]
[f]
[g]
[h]

2 [a]
[b]
[c]
[d]
[e]
[f]
[g]
[h]
[i]
[j]
[k]
[l]
[m]
[n]
[o]
[p]
[q]
[r]

3 (Pattern :)

4 [a] ……
(Pattern :)
[b] ……
(Pattern :)
There are other solutions.

5

6

Answers of the main book

Exercise 14

1 [a] 9 [b] 7 [c] 10
[d] 12 [e] 9 [f] 24
[g] 64 [h] 18 cm³ [i] 36 cm³
[j] 12 cm³ [k] 11 cm³ [l] 96 cm³

2 The volume of the first solid = 13 × 8 = 104 cm³
The volume of the second solid
= 10 × 8 = 80 cm³

3 [a] any object that occupies a room in the space
[b] 6 , rectangle , equal
[c] 6 , square , area [d] 12
[e] 8 [f] equal [g] 12
[h] volume [i] an edge
[j] the volume of a cube whose edge length is 1 cm.

4 [a] 4 m³ = 4 × 1 000 = 4 000 dm³
[b] 120 dm³ = 120 × 1 000 = 120 000 cm³
[c] 6 500 dm³ = 6 500 ÷ 1 000 = 6.5 m³
[d] 8 200 mm³ = 8 200 ÷ 1 000 = 8.2 cm³
[e] 5 cm³ = 5 × 1 000 = 5 000 mm³
[f] 4 300 cm³ = 4 300 ÷ 1 000 = 4.3 dm³
[g] 3 m³ = 3 × 1 000 000 000
= 3 000 000 000 mm³
[h] 0.07 dm³ = 0.07 × 1 000 000 = 70 000 mm³
[i] 2.1 cm³ = 2.1 × 1 000 = 2 100 mm³
[j] 2 580 000 mm³ = 2 580 000 ÷ 1 000 000 000
= 0.00258 m³
[k] 0.001 cm³ = 0.001 × 1 000 = 1 mm³

5 [a] the volume [b] 8 [c] 12
[d] 6 [e] 5 [f] 1 000
[g] 0.01 [h] 2 000 [i] $\frac{1}{1\,000}$
[j] 12 000 [k] 300 [l] 4.2
[m] 0.0002 [n] $\frac{1}{10\,000}$ [o] m³
[p] 5 000 dm³ [q] 1.08



Exercise 15

1 [a] The volume = 4 × 2 × 3 = 24 cm^3.
[b] The volume = 3 × 5 × 2 = 30 cm^3.
[c] The volume = 8 × 1 × 1 = 8 cm^3.
[d] The volume = 4 × 0.5 × 0.5 = 1 cm^3.

2

Dimensions of cuboid (cm.)			Base area (cm^2)	Volume (cm^3)
Length	Width	Height		
4	3	7	**12**	**84**
7	8	9	**56**	**504**
5	11	**8**	**55**	440
7	**4**	13	28	364
12	**15**	18	**180**	3 240
25	16	**37**	**400**	14 800

3

Base area (cm^2)	Height (cm.)	Volume (cm^3)
42	5	**210**
80	9	**720**
22.5	**50**	1 125
37.5	**40**	1 500
32.5	38	1 235
65	27.5	1 787.5

4 [a] length × width × height
[b] base area × height
[c] $\frac{\text{Volume}}{\text{Base area}}$ [d] 30 [e] 1 600 cm^3
[f] 9 [g] 7 cm^2 [h] 4

5 [a] 360 cm^3 [b] 10 [c] 6
[d] 20 [e] 10 cm. [f] 36

6 The volume = 12 × 10 × 8 = 960 cm^3.

7 The volume = 12 × 3 = 36 m^3.

8 The number of cubic centimetres
= 17 × 13 × 11 = 2 431 cm^3.

9 The base area = 6 × 6 = 36 cm^2.
The volume of juice = 36 × 15 = 540 cm^3.

10 The 1^{st} cuboid volume = 70 × 50 × 30
= 105 000 cm^3.
The 2^{nd} cuboid volume = 2 925 × 35
= 102 375 cm^3.
The 1^{st} cuboid is greater in volume than the 2^{nd} cuboid.

11 The volume of the first cuboid = 4 × 5 × 7
= 140 cm^3.
The volume of the second cuboid = 16 × 9
= 144 cm^3.
The difference between their volumes
= 144 − 140 = 4 cm^3.

12 The base area = $\frac{2\,128}{28}$ = 76 cm^2.

13 The height of the cuboid = $\frac{4.8 \times 1\,000}{240}$
= $\frac{4\,800}{240}$ = 20 cm.

14 The height = $\frac{8\,000}{25 \times 16}$ = 20 cm.

15 The base area = 25 × 25 = 625 cm^2.
The height of water = $\frac{8\,100}{625}$ = 12.96 cm.

16 The base area = $\frac{6\,480}{15}$ = 432 cm^2.
The length = $\frac{432}{18}$ = 24 cm.

17 [a] The width = $\frac{2\,128}{19 \times 14}$ = 8 cm.
[b] The base area = $\frac{2\,128}{14}$ = 152 cm^2.

18 The side length of the base = $\frac{20}{4}$ = 5 cm.
The volume = 5 × 5 × 7 = 175 cm^3.

19 The volume of a brick = 25 × 12 × 6
= 1 800 cm^3.
The volume of the wall = 1 800 × 1 500
= 2 700 000 cm^3.
= 2.7 m^3.

20 The volume of the box = 50 × 40 × 30
= 60 000 cm^3.
The volume of a block of soap
= 8 × 5 × 3 = 120 cm^3.
The number of soap blocks
= 60 000 ÷ 120 = 500 blocks.

21 The volume of the carton box
= 50 × 40 × 30 = 60 000 cm^3.
The volume of the tea box
= 10 × 5 × 6 = 300 cm^3.
The number of tea boxes
= 60 000 ÷ 300 = 200 boxes.

22 The volume of the sand = 2.5 × 1.6 × 0.7
= 2.8 m^3.
The price of the sand = 2.8 × 7.75
= L.E. 21.7

23 [a] The volume of the truck = 3.2 × 1.5 × 2
= 9.6 m^3.
= 9 600 000 cm^3.
The volume of the box = 40 × 25 × 25
= 25 000 cm^3.
The number of boxes = 9 600 000 ÷ 25 000
= 384 boxes.
[b] The cost of transportation = 384 × 0.75
= 288 pounds.

24 [a] The volume of the lorry = 5 × 1.8 × 0.6
= 5.4 m^3
= 5 400 000 cm^3.
The volume of a brick = 25 × 12 × 6
= 1 800 cm^3.
The number of bricks = 5 400 000 ÷ 1 800
= 3 000 bricks.
[b] The cost of transportation = 3 × 35
= 105 pounds.

25 [a] The inner volume of the lorry = 4 × 2 × 0.6
= 4.8 m^3.
The volume of the needed sand
= 4.8 × 10 = 48 m^3.
[b] The thickness of the sand in the playground
= $\frac{48}{40 \times 30}$ = 0.04 m. = 4 cm.

26 The volume of water = 70 × 50 × 40
= 140 000 cm^3.
The base area of the second container
= 140 000 ÷ 100 = 1 400 cm^2.

27 The base area = 30 × 30 = 900 cm^2.
The height of oil = 45 000 ÷ 900 = 50 cm.

28 The height of water = 3 − 0.4 = 2.6 m.
The volume of the water
= 60 × 25 × 2.6 = 3 900 m^3.

29 The height of water = $\frac{1\,008}{30 \times 12}$ = 2.8 m.
So , the height of the empty part
= 3 − 2.8 = 0.2 m.
The volume of the required water
= 30 × 12 × 0.2 = 72 m^3.

30 [a] The base area = 30 × 15 = 450 m^2.
The height of water = 405 ÷ 450 = 0.9 m.
[b] The height of the empty part
= 2 − 0.9 = 1.1 m.
The volume of the needed water
= 1.1 × 30 × 15 = 495 m^3.
Another solution :
The volume of the swimming pool
= 2 × 30 × 15 = 900 m^3.
The volume of the needed water
= 900 − 405 = 495 m^3.

31 [a] The volume of the tank = 12 × 25 × 16
= 4 800 dm^3
= 4.8 m^3.
The time needed for the tank to be filled
= 4.8 ÷ 4.8 = 1 hour
[b] The height of water after quarter of an hour = 16 ÷ 4 = 4 dm.

32 Length + width = $\frac{96}{2}$ = 48 cm.
The width = 48 − 40 = 8 cm.
The volume of the cuboid = 40 × 8 × 15
= 4 800 cm^3.

33

1^{st} dimension	2^{nd} dimension	3^{rd} dimension	Sum
5	4	3	12
?	?	?	48

The 1^{st} dimension = $\frac{5 \times 48}{12}$ = 20 cm.



The 2^{nd} dimension = $\frac{4 \times 48}{12}$ = 16 cm.

The 3^{rd} dimension = $\frac{3 \times 48}{12}$ = 12 cm.

The volume = 20 × 16 × 12 = 3 840 cm^3

34 Since the cuboid has 4 lengths , 4 widths and 4 heights , then

length + width + height = 180 ÷ 4 = 45 cm.

Length	Width	Height	Sum
4	3	2	9
?	?	?	45

The length = $\frac{4 \times 45}{9}$ = 20 cm.

The width = $\frac{3 \times 45}{9}$ = 15 cm.

The height = $\frac{2 \times 45}{9}$ = 10 cm.

The volume = 20 × 15 × 10 = 3 000 cm^3

35 The side length of the base = 40 ÷ 4 = 10 cm.

Side length	Height
1	3
10	?

The height = $\frac{10 \times 3}{1}$ = 30 cm.

The volume = 10 × 10 × 30 = 3 000 cm^3

36 Half of the perimeter = 40 ÷ 2 = 20 cm.

Length	Width	Sum
3	2	5
?	?	20

The length = $\frac{3 \times 20}{5}$ = 12 cm.

The width = $\frac{2 \times 20}{5}$ = 8 cm.

The volume = 12 × 8 × 10 = 960 cm^3

37 [a] The volume = (4 × 5 × 3) + (3 × 4 × 2)
= 84 cm^3

[b] The volume = (4 × 9 × 7) − (3 × 4 × 4)
= 204 cm^3

38 length + length + length + length = 3 × 4 = 12 cm.
width + width + width + width = 2 × 4 = 8 cm.
, then
height + height + height + height
= 40 − (12 + 8) = 20 cm.
, then the height = $\frac{20}{4}$ = 5 cm.
the volume = 3 × 2 × 5 = 30 cm^3

39 The length + The width = 8 (1)
, The width + The height = 7 (2)
, The length + The height = 9 (3)
By adding (1) , (2) and (3) :
Then , 2 the length + 2 the width + 2 the height = 24
So , the length + the width + the height = 12 (4)
From (1) and (4) we get : the height = 4 cm.
From (2) and (4) we get : the length = 5 cm.
From (3) and (2) we get : the width = 3 cm.
So, the volume of the cuboid
= 4 × 5 × 3 = 60 cm^3

40 The possible dimensions are (1 cm. , 1 cm. and 48 cm.) or (2 cm. , 2 cm. and 12 cm.) or (4 cm. , 4 cm. and 3 cm.)

Exercise 16

1 [a] equal [b] cube
[c] the edge length × itself × itself
[d] 27 [e] 216 [f] 8 [g] 125
[h] 27 [i] 64 [j] 8 [k] 27

2 [a] 64 cm^3 [b] 1 [c] 729
[d] 1 cm^3 [e] 2 [f] 25 cm^2 [g] 12
[h] 25 [i] 27 cm^3 [j] 1 : 1

3

The cube				
The edge length (cm.)	The perimeter of the base (cm.)	The area of the base (cm^2)	The sum of lengths of all edges (cm.)	The volume (cm^3)
6	24	36	72	216
5	20	25	60	125
7	28	49	84	343
9	36	81	108	729

4 The volume = 2 × 2 × 2 = 8 cm^3

5 The volume = 1.5 × 1.5 × 1.5 = 3.375 dm^3

6 The edge length = 40 ÷ 4 = 10 cm.
The volume = 10 × 10 × 10 = 1 000 cm^3

7 The edge length = 132 ÷ 12 = 11 cm.
The volume = 11 × 11 × 11 = 1 331 cm^3

8 The area of one face = 64 cm^2 = (8 × 8) cm^2
The edge length = 8 cm.
The volume = 8 × 8 × 8 = 512 cm^3

9 The volume of the cube = 125 cm^3
= (5 × 5 × 5) cm^3
The edge length = 5 cm.
The area of one face = 5 × 5 = 25 cm^2

10 The volume of the cuboid
= 12 × 10 × 8 = 960 cm^3
The volume of the cube
= 10 × 10 × 10 = 1 000 cm^3
The cube is greater in volume.

11 The volume of the cube = 8 × 8 × 8
= 512 cm^3
The volume of the cuboid = 5 × 12.5 × 8
= 500 cm^3
The cube is greater in volume.
The difference = 512 − 500 = 12 cm^3

12 The volume of the cuboid = 72 × 12
= 864 cm^3
The area of one face of the cube = 100 cm^2
= (10 × 10) cm^2
The edge length of the cube = 10 cm.
The volume of the cube = 10 × 10 × 10
= 1 000 cm^3
The volume of the cube is greater.

13 The edge length = $\frac{30}{3}$ = 10 cm.
The volume of the cube = 10 × 10 × 10
= 1 000 cm^3

14 The volume of the cuboid = 4 × 6 × 9 = 216 cm^3
The edge length of the cube = 6 cm.

15 The volume of the cube
= 8 × 8 × 8 = 512 cm^3
The volume of a small cube
= 2 × 2 × 2 = 8 cm^3
The number of the small cubes = $\frac{512}{8}$
= 64 small cubes.

16 The volume of cheese = 15 × 15 × 15
= 3 375 cm^3
The volume of a small cube = 3 × 3 × 3
= 27 cm^3
The number of the small cubes = 3 375 ÷ 27
= 125 cubes.

17 The volume of the box = 50 × 40 × 30
= 60 000 cm^3
The volume of one bar = 10 × 10 × 10
= 1 000 cm^3
The number of bars = 60 000 ÷ 1 000
= 60 bars.

18 The volume of the cube = 12 × 12 × 12
= 1 728 cm^3
The volume of an alloy = 3 × 4 × 6
= 72 cm^3
The number of alloys = 1 728 ÷ 72
= 24 alloys.

19 The volume of the oil = 36 × 36 × 36
= 46 656 cm^3
The internal volume of the small tin
= 9 × 9 × 9 = 729 cm^3
The number of the small tins = 46 656 ÷ 729
= 64 tins.

20 The volume of the cube = 36 × 36 × 36
= 46 656 cm^3
The volume of the cuboid
= the volume of the cube = 46 656 cm^3
The base area of the cuboid = 48 × 27
= 1 296 cm^2
The height of the cuboid = 46 656 ÷ 1 296
= 36 cm.

21 The volume of the cube = 6 × 6 × 6
= 216 cm^3
The base area of the cuboid = 4 × 4 = 16 cm^2
The height of the cuboid = $\frac{216}{16}$ = 13.5 cm.

22 The volume of the cuboid = 45 × 40 × 12
= 21 600 cm^3
The volume of the cube = 30 × 30 × 30
= 27 000 cm^3
The cube is the suitable because its inner volume equals the volume of the rice.

23 The area of one face = 54 ÷ 6 = 9 cm²
= (3 × 3) cm²
The edge length = 3 cm.
The volume = 3 × 3 × 3 = 27 cm³

24 The volume of the cubic case = 12 × 12 × 12
= 1 728 cm³
The price of one case = 1 728 × 0.05
= 86.4 pounds.
The price of 3 cases = 86.4 × 3 = 259.2 pounds.

25 The volume of the bottle = 6 × 6 × 6
= 216 cm³
The price = 216 × 0.4 = L.E. 86.4

26 The outer volume of the small box
= 30 × 30 × 30 = 27 000 cm³
The inner volume of the large box
= 36 × 36 × 36 = 46 656 cm³
The volume of sponge = 46 656 – 27 000
= 19 656 cm³

27 The volume of the 1st container
= 20 × 25 × 30 = 15 000 cm³
The volume of the 2nd container
= 30 × 30 × 30 = 27 000 cm³
The sum of the volumes
= 15 000 + 27 000 = 42 000 cm³
The number of bottles = $\frac{42\ 000}{500}$
= 84 bottles.

28 The volume of the basin = 100 × 100 × 100
= 1 000 000 cm³
The time = $\frac{1\ 000\ 000}{10\ 000}$ = 100 minutes.

29 The volume of the cube = 18 × 18 × 18
= 5 832 cm³
The volume of the small cube = $\frac{5\ 832}{216}$
= 27 cm³
Thus , the edge length of each small cube is 3 cm.

30 The volume of the metallic piece
= 3 × 3 × 3 = 27 cm³

31 The volume of the metallic piece
= 30 × 30 × 5 = 4 500 cm³

32 The interal volume of the cube
= 35 × 35 × 35 = 42 875 cm³
∵ the outer edge of the cube is of length
= 35 + (0.5 + 0.5) = 36 cm.
∴ the outer volume of the cube
= 36 × 36 × 36 = 46 656 cm³
The volume of the glass = 46 656 – 42 875
= 3 781 cm³

33 The internal volume of the cube
= 20 × 20 × 20 = 8 000 cm³
The outer length = 20 + (0.75 + 0.75) = 21.5 cm.
The outer width = 20 + (0.75 + 0.75) = 21.5 cm.
The outer height = 20 + 0.75 = 20.75 cm.
The outer volume = 21.5 × 21.5 × 20.75
= 9591.6875 cm³
The volume of glass = 9591.6875 – 8 000
= 1591.6875 cm³

Exercise 17

1 [a] m³ [b] m³ [c] litre
[d] mL. [e] m³ [f] litre

2 [a] 370 dm³ = 370 × 1 000 = 370 000 cm³
[b] 0.007 m³ = 0.007 × 1 000 000 = 7 000 cm³
[c] 8.25 litres = 8.25 dm³ = 8.25 × 1 000
= 8 250 cm³
[d] 8 700 mm³ = 8 700 ÷ 1 000 = 8.7 cm³
[e] 4.4 millilitres = 4.4 cm³
[f] 80 millilitres = 80 cm³

3 [a] 640 000 cm³ = 640 000 ÷ 1 000 000
= 0.64 m³
[b] 6 810 dm³ = 6 810 ÷ 1 000 = 6.81 m³
[c] 33.67 litres = 33.67 ÷ 1 000 = 0.03367 m³
[d] 356.4 dm³ = 356.4 ÷ 1 000 = 0.3564 m³
[e] 459.4 litres = 459.4 ÷ 1 000 = 0.4594 m³
[f] 4 500 000 mL. = 4 500 000 ÷ 1 000 000
= 4.5 m³

4 [a] 550 000 cm³ = 550 000 ÷ 1 000 = 550 litres.
[b] 539 cm³ = 539 ÷ 1 000 = 0.539 litre.
[c] 631.7 cm³ = 631.7 ÷ 1 000 = 0.6317 litre.
[d] 9.18 m³ = 9.18 × 1 000 = 9 180 litres.
[e] 47.9 dm³ = 47.9 litres.
[f] 5 500 mL. = 5 500 ÷ 1 000 = 5.5 litres.

5 [a] The volume of the inner space of a hollow solid.
[b] 4 600 [c] 4 630 [d] 7 000
[e] 500 [f] 7.3 [g] 2
[h] 5 600 [i] 0.93 [j] 7
[k] 1 500 000 000 [l] ascending
[m] 4 [n] 16 [o] 4
[p] 216 [q] 5 [r] 271

6 [a] capacity [b] 1 000 [c] 5.3
[d] 38 [e] 300 [f] 2 500 cm³
[g] 20 litres [h] 850 dm³ [i] 750 cm³
[j] 1.95 [k] 1 000 cm³

7 The capacity of the pot
= 20 × 20 × 20 = 8 000 cm³
= 8 000 ÷ 1 000 = 8 litres.

8 The base area = 30 × 30 = 900 cm²
The volume of the juice = 900 × 50 = 45 000 cm³
= 45 000 ÷ 1 000 = 45 litres.

9 The capacity of the swimming pool
= 40 × 30 × 1.8 = 2 160 m³
= 2 160 × 1 000 = 2 160 000 litres.

10 [a] The capacity of the aquarium
= 40 × 30 × 60 = 72 000 cm³
= 72 000 millilitres.
[b] The capacity of the aquarium
= 72 000 cm³ = 72 000 ÷ 1 000 = 72 litres.

11 The capacity of the cubic vessel
= 40 × 40 × 40 = 64 000 cm³ = 64 000 mL.
The capacity of the cuboid vessel
= 50 × 30 × 60 = 90 000 cm³ = 90 000 mL.
The difference = 90 000 – 64 000 = 26 000 mL.

12 The number of bottles = 500 ÷ 25
= 20 bottles.

13 The capacity of the vessel = 75 × 40 × 150
= 450 000 cm³
= 450 000 ÷ 1 000 = 450 litres.
The number of the bottles = 450 ÷ 1.5
= 300 bottles.

14 The capacity of the large bottle
= $\frac{3}{4}$ × 1 000 = 750 cm³
The number of the small bottles
= 750 ÷ 25 = 30 bottles.

15 The capacity of the container = 12 × 1 000
= 12 000 cm³
The number of bottles
= 12 000 ÷ 400 = 30 bottles.

16 What the patient takes in one day
= 3 + 3 = 6 mL. = 6 cm³
The number of days = 240 ÷ 6 = 40 days.

17 The capacity of the first container
= 30 × 25 × 32 = 24 000 cm³
= 24 000 ÷ 1 000 = 24 litres.
The capacity of the second container
= 40 × 40 × 40 = 64 000 cm³
= 64 000 ÷ 1 000 = 64 litres.
The total capacity = 24 + 64 = 88 litres.
The number of bottles = 88 ÷ 0.8 = 110 bottles.

18 The area of the base = $\frac{72\ 000}{40}$ = 1 800 dm²

19 The volume of the water = 20 litres
= 20 × 1 000 = 20 000 cm³
The base area = 50 × 40 = 2 000 cm²
The height of the water = 20 000 ÷ 2 000
= 10 cm.

20 The volume of the water = 10 litres
= 10 × 1 000 = 10 000 cm³
The base area = 25 × 25 = 625 cm²
The height of the water = 10 000 ÷ 625
= 16 cm.

21 The volume of molasses in each tin

$= \frac{56}{25} = 2.24$ litres $= 2\,240$ cm^3

The base area $= 16 \times 10 = 160$ cm^2

The height of the molasses $= \frac{2\,240}{160} = 14$ cm.

22 The side length of the square $= 60 \div 4 = 15$ cm.

The capacity $= 15 \times 15 \times 40 = 9\,000$ cm^3

$= 9$ litres.

23 Since the tank was filled to its third , then the height of the empty part $= \frac{2}{3} \times 360 = 240$ cm.

The volume of the empty part

$= 250 \times 200 \times 240 = 12\,000\,000$ cm^3

The capacity $= 250 \times 200 \times 360$

$= 18\,000\,000$ cm^3 $= 18\,000$ litres.

24 [a] The capacity of the vessel $= 30 \times 30 \times 30$

$= 27\,000$ cm^3 $= 27\,000 \div 1\,000 = 27$ litres.

[b] The price of all oil $= 27 \times 9.5$

$= 256.5$ pounds.

25 The capacity of the tin $= 10 \times 20 \times 30$

$= 6\,000$ cm^3 $= 6$ litres.

The price of the honey $= 6 \times 25 =$ L.E. 150

26 Half the perimeter of the base $= 8 \div 2 = 4$ m.

Width	Length	Sum
3	5	8
?	?	4

The width $= \frac{3 \times 4}{8} = 1.5$ m.

The length $= \frac{5 \times 4}{8} = 2.5$ m.

The capacity of the tank $= 1.5 \times 2.5 \times 3$

$= 11.25$ m^3 $= 11.25 \times 1\,000 = 11\,250$ litres.

27 [a] The height of solar $= \frac{1}{3} \times 42 = 14$ cm.

The volume of solar $= 25 \times 30 \times 14$

$= 10\,500$ cm^3

$= 10\,500 \div 1\,000 = 10.5$ litres.

[b] The total price of solar in the container

$= 10.5 \times 1.2 = 12.6$ pounds.

28 The inner edge length $= 52 - 2 = 50$ cm.

The capacity of the box

$= 50 \times 50 \times 50 = 125\,000$ cm^3 $= 125$ litres.

29 The inner dimensions of the box are 64 cm. , 68 cm. and 56 cm.

The capacity of the box $= 64 \times 68 \times 56$

$= 243\,712$ cm^3 $= 243\,712 \div 1\,000$

$= 243.712$ litres $\simeq 243.71$ litres.

30 [a] The volume of poured water in $\frac{1}{2}$ an hour

$= 2\,800 \times \frac{1}{2} = 1\,400$ litres.

The base area $= 250 \times 160 = 40\,000$ cm^2

The height $= \frac{1\,400 \times 1\,000}{40\,000} = 35$ cm.

[b] The capacity of the tank

$= 250 \times 160 \times 140 = 5\,600\,000$ cm^3

$= 5\,600$ litres.

2 800 litres $\xrightarrow{per}$ 1 hour

5 600 litres $\xrightarrow{per}$ x hour

, the needed time $x = \frac{5\,600}{2\,800} = 2$ hours.

Answers of unit test

1 [a] 27 [b] 4 600 [c] rectangle [d] 5 [e] 180°

2 [a] ☐ [b] 12 , 8 [c] 30 [d] 2 [e] 2

3 [a] The volume of the box $= 50 \times 40 \times 30$

$= 60\,000$ cm^3

The volume of one bar $= 10 \times 10 \times 10$

$= 1\,000$ cm^3

The number of bars $= 60\,000 \div 1\,000$

$= 60$ bars

[b] (1) The capacity of the vessel

$= 15 \times 15 \times 15 = 3\,375$ cm^3

$= 3.375$ litres

(2) The price of the honey $= 3.375 \times 8$

$=$ L.E. 27

4 [a]

1st dimension	2nd dimension	3rd dimension	Sum
2	5	7	14
?	?	?	70

The 1st dimension $= \frac{2 \times 70}{14} = 10$ cm.

The 2nd dimension $= \frac{5 \times 70}{14} = 25$ cm.

The 3rd dimension $= \frac{7 \times 70}{14} = 35$ cm.

The volume $= 10 \times 25 \times 35 = 8\,750$ cm^3

[b] (1) m (∠ D) = m (∠ B) = 100°

(2) m (∠ BAD) = 180° − 100° = 80°

m (∠ BAC) = 80° − 30° = 50°

(3) In Δ ACD , m (∠ ACD)

= 180° − (30° + 100°) = 50°

5 [a] The base area $= 13 \times 13 = 169$ cm^2

The height of water $= \frac{1183}{169} = 7$ cm.

[b] The area of one face $= 150 \div 6$

$= 25$ cm^2

$= (5 \times 5)$ cm^2

The edge length $= 5$ cm.

The volume $= 5 \times 5 \times 5 = 125$ cm^3

Unit Four

Exercise 18

1 [a] descriptive data , quantitative data
[b] descriptive [c] quantitative
[d] descriptive [e] quantitative

2 [a] the favourite colour [b] age
[c] weight [d] address
[e] age
[f] the favourite colour

3 [a] Natural juice , mango , nectar.
[b] Size , expiry , filling date

4 The descriptive data : natural milk , full cream.
The quantitative data : price , expiry , production date , size.

5 [a] Age , membership no.
[b] Personal photo , name , sport.

6 [a] • The descriptive data : personal photo , school , name , grade , address , class , blood type.
• The quantitative data : school year , birthday , Tel. no.
[b] Do it by yourself.

7 • The columns that represent descriptive data : name , qualification , neighbourhood.
• The columns that represent quantitative data : No. , age , hiring date , Tel. no.

Exercise 19

1 [a] Orange
The percentage of orange
$= \frac{16}{60} \times 100\% = 26\frac{2}{3}\%$
[b] Apple
The percentage of apple
$= \frac{8}{60} \times 100\% = 13\frac{1}{3}\%$
[c] The number of kg. of watermelon
$= 14 \times 1000 = 14\ 000$ kg.
The descending order is : Orange , watermelon , mango , banana and apple.
The order of the watermelon is the second.
[d] The number of tons of banana = 10 tons.
The percentage of banana
$= \frac{10}{60} \times 100\% = 16\frac{2}{3}\%$

2 [a] Russia
The percentage of the Russian tourists
$= \frac{2.35}{6.73} \times 100\% \approx 34.9\%$
[b] France
The number of the French tourists
$= 0.8 \times 1\ 000\ 000 = 800\ 000$ tourists
[c] The number of German tourists
$= 1.2 \times 1\ 000\ 000 = 1\ 200\ 000$ tourists.
The percentage of the German tourists
$= \frac{1.2}{6.73} \times 100\% \approx 17.8\%$

3 We form the tally frequency table :

Place	Tally	Frequency
Pyramids	HH ///	8
Zoo	HH	5
Cairo Tower	///	3
Egyptian Museum	////	4
Total		20

We omit the tally column :

Place	Pyramids	Zoo	Cairo Tower	Egyptian Museum	Total
Frequency	8	5	3	4	20

The most popular place is Pyramids.

4 The tally frequency table :

General evaluation	Tally	Frequency
Pass	HH ////	9
Good	HH HH ////	14
V. good	HH HH /	11
Excellent	HH /	6
Total		40

The simble frequency table :

General evaluation	Pass	Good	V.good	Excellent	Total
Frequency	9	14	11	6	40

- The most common evaluation is good.
- The least common evaluation is excellent.
- Do by yourself.

5 [a] The tally frequency table :

Kind	Tally	Frequency
Philosophy	////	4
Sociology	HH ////	9
Science	HH HH	10
Literature	HH HH /	11
Languages	HH	5
Arts	///	3
Stories	HH ///	8
Total		50

[b] The simple frequency table :

Kind	Philosophy	Sociology	Science	Literature	Languages	Arts	stories	Total
Frequency	4	9	10	11	5	3	8	50

[c] literature , 22%
[d] Arts , 6%
[e] 10 , 20%

6 The tally frequency table :

Nationality	Tally	Frequency
Russian	HH ////	9
American	HH //	7
British	HH	5
Italian	HH ///	8
French	////	4
Total		33

The simple frequency table :

Nationality	Russian	American	British	Italian	French	Total
Frequency	9	7	5	8	4	33

[a] Russian.
The percentage of the Russian tourists
$= \frac{9}{33} \times 100\% = 27\frac{3}{11}\%$
[b] French
The percentage of the French tourists
$= \frac{4}{33} \times 100\% = 12\frac{4}{33}\%$
[c] Do by yourself.

7 The tally frequency table :

Flavor	Tally	Frequency
Tomato	HH	5
Cheese	HH //	7
Shrimp	HH ////	9
Salt	HH HH /	11
Spices	HH ///	8
Total		40

The simple frequency table :

Flavor	Tomato	Cheese	Shrimp	Salt	Spices	Total
Frequency	5	7	9	11	8	40

[a] Salt
The percentage of salt $= \frac{11}{40} \times 100\%$
$= 27.5\%$
[b] The order is : salt , shrimp , spices , cheese and tomato.

Exercise 20

1 [a] the range
[b] the maximum value – the minimum value
[c] 80 [d] 7 [e] 16
[f] 40 [g] 79 [h] 48
[i] 10 [j] 8

2 [a] 6 [b] 28 [c] 30 [d] 4 [e] 8

3

No. of brothers and sisters	Tally	Frequency
0	HH ////	9
1	HH HH ////	14
2	HH //	7
3	HH /	6
4	//	2
5	//	2
Total		40

[a] 7 , the percentage $= \frac{7}{40} \times 100\% = 17.5\%$
[b] 9 , the percentage $= \frac{9}{40} \times 100\% = 22.5\%$
[c] 1

4

The ages	Tally	Frequency
14	卌	5
15	卌 III	8
16	卌 IIII	9
17	卌 III	8
18	卌 I	6
19	III	3
20	I	1
Total		40

The ages	Frequency
14	5
15	8
16	9
17	8
18	6
19	3
20	1
Total	40

[a] The range = 20 – 14 = 6 [b] 16 years.

[c] 10 students ,
the percentage = $\frac{10}{40} \times 100\% = 25\%$

5

Sets	Tally	Frequency
15 –	II	2
25 –	III	3
35 –	卌	5
45 –	卌 III	8
55 –	卌 I	6
65 –	IIII	4
75 –	II	2
Total		30

Sets	Frequency
15 –	2
25 –	3
35 –	5
45 –	8
55 –	6
65 –	4
75 –	2
Total	30

[a] 5 [b] 2 [c] 12

6

Sets	Tally	Frequency
0 –	II	2
4 –	卌 II	7
8 –	卌 卌 II	12
12 –	卌 卌 卌	15
16 –	IIII	4
Total		40

Sets	Frequency
0 –	2
4 –	7
8 –	12
12 –	15
16 –	4
Total	40

The number of the pupils who got 12 marks or more = 15 + 4 = 19

Their percentage = $\frac{19}{40} \times 100\% = 47.5\%$

7

Sets	Tally	Frequency
11 –	卌 卌	10
16 –	IIII	4
21 –	卌 卌 III	13
26 –	卌 卌 III	13
Total		40

Sets	Frequency
11 –	10
16 –	4
21 –	13
26 –	13
Total	40

The number of workers = 13 + 13 = 26

The percentage = $\frac{26}{40} \times 100\% = 65\%$

8

Sets	Tally	Frequency
155 –	卌 卌 卌	15
165 –	卌 卌 II	12
175 –	卌 卌	10
185 –	卌 IIII	9
195 –	II	2
Total		48

Sets	Frequency
155 –	15
165 –	12
175 –	10
185 –	9
195 –	2
Total	48

[a] 2 applicants ,
the percentage = $\frac{2}{48} \times 100\% = 4\frac{1}{6}\%$

[b] 15 applicants ,
the percentage = $\frac{15}{48} \times 100\% = 31.25\%$

[c] Answer by yourself.

9 [a] 8 pupils.

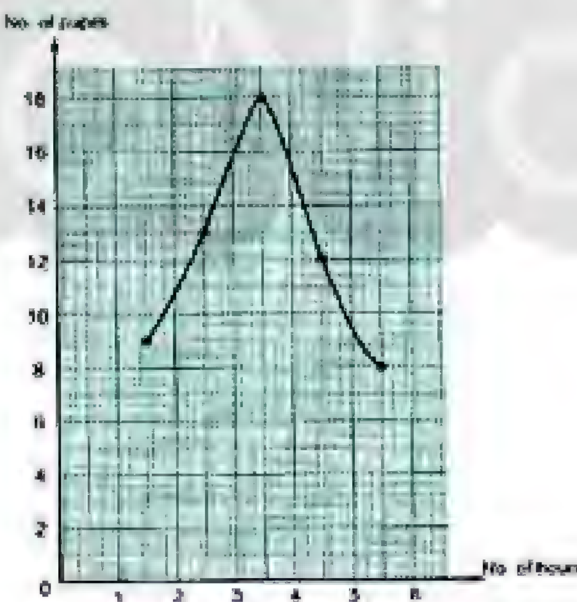
[b] 11 pupils ,
the percentage = $\frac{11}{40} \times 100\% = 27.5\%$

10 [a] 14 workers.

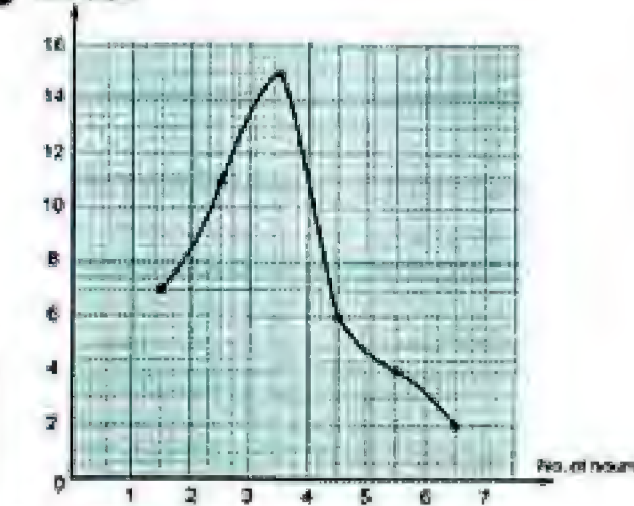
[b] 47 workers ,
the percentage = $\frac{47}{65} \times 100\%$
$= 72\frac{4}{13}\%$

Exercise 21

1

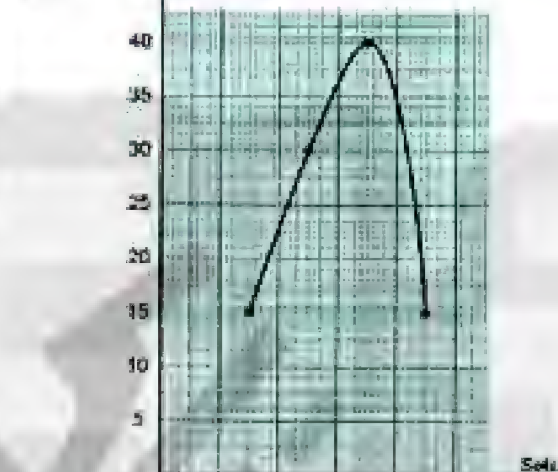


2



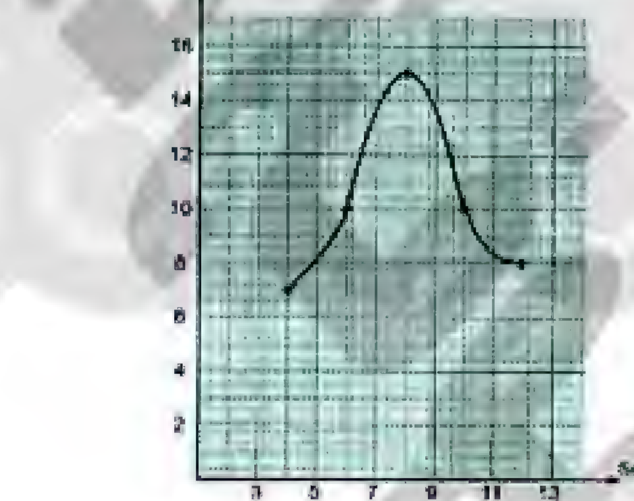
3 [a] 45 students.

[b]

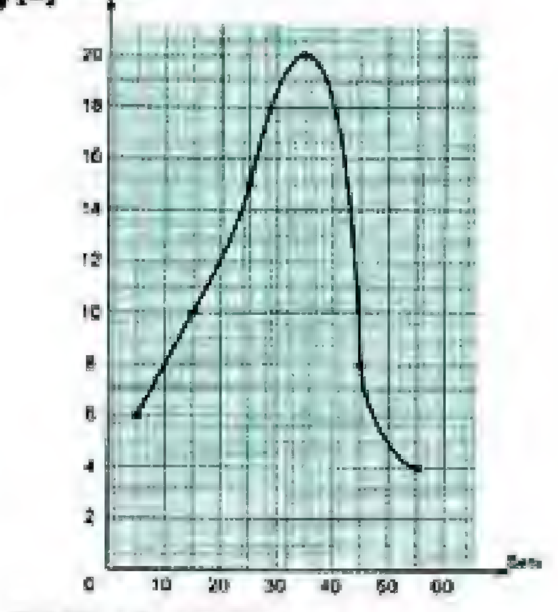


4 [a] 33 students.

[b]



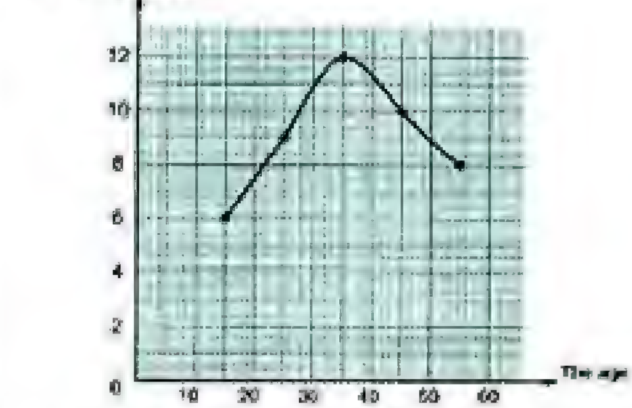
5 [a]



[b] (1) 16 students.
(2) 12 students.

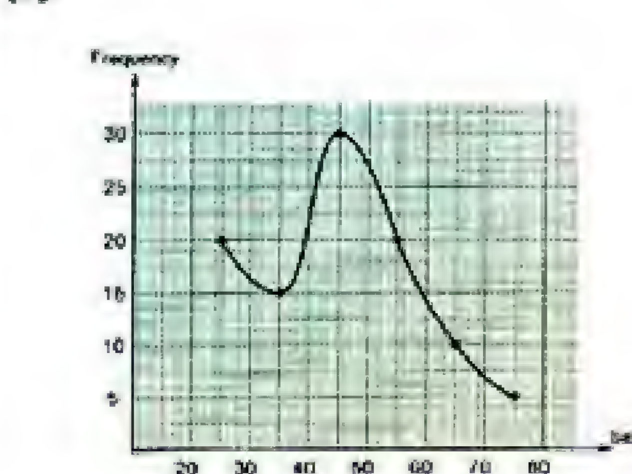
6 [a] 27 visitors.

[b]



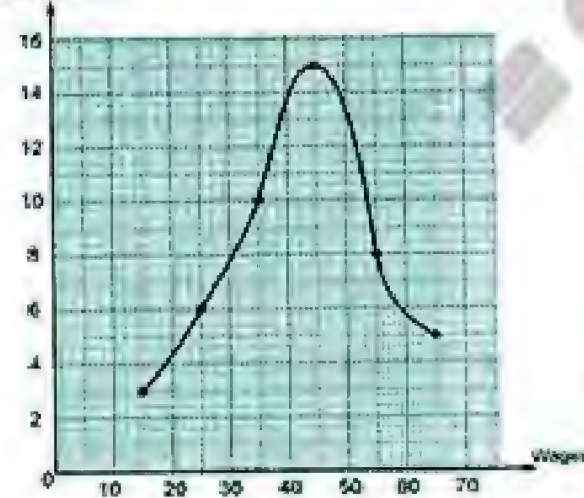
7 [a] 65 workers.

[b]



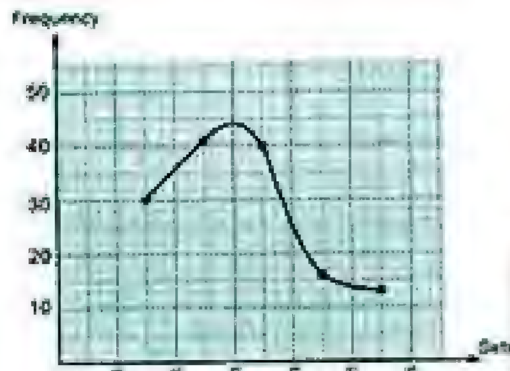


8 [a]



[b] 28 workers.

9

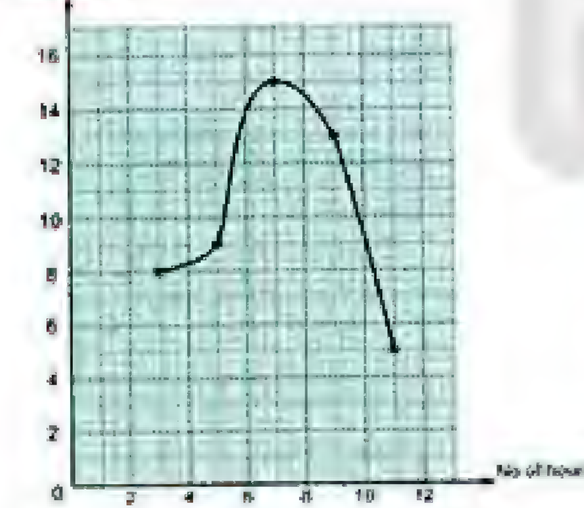


[a] 71 trips.

[b] The percentage = $\frac{40}{140} \times 100\% = 28\frac{4}{7}\%$

10 [a] 5

[b]

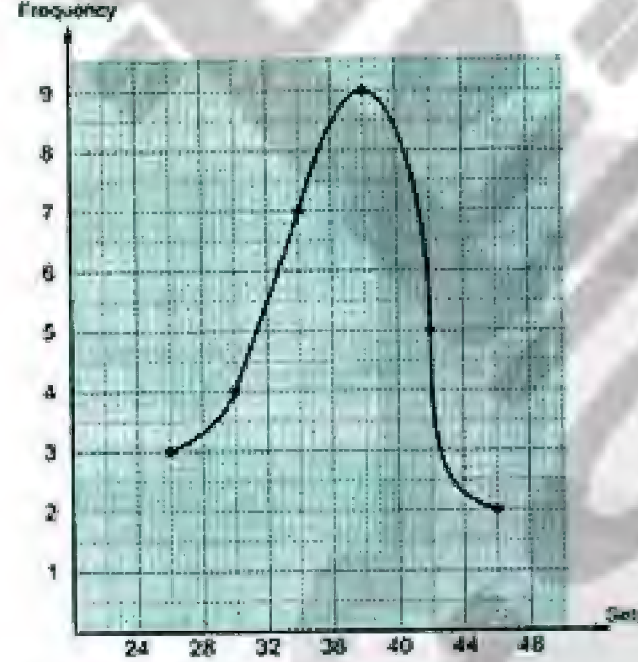


11 [a] $x = 30$, $y = 40 - (5 + 8 + 11 + 9) = 7$

[b] From 30 to less than 40

[c] 27 persons.

12

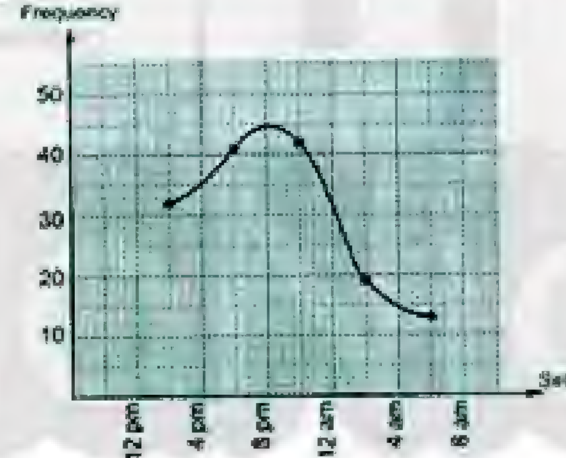


[a] 7 cities , answer by yourself.

[b] Answer by yourself.

[c] Answer by yourself.

13



[a] From 8 pm to before 12 am because this period of time the Cairo airport has the greatest number of air flights.

[b] From 4 am to before 8 am.

[c] The percentage = $\frac{32}{147} \times 100\% = 21\frac{113}{147}\%$

[d] The percentage = $\frac{147}{147} \times 100\% = 100\%$

Answers of unit test

1 [a] 6 [b] 6

[c] the favourite colour [d] birth place

[e] 25

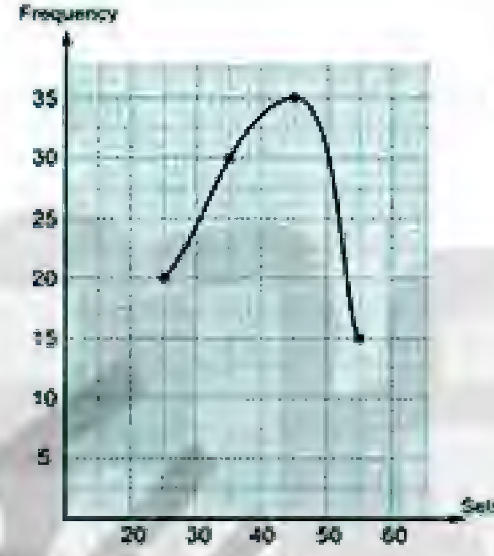
2 [a] descriptive [b] the range

[c] 47 [d] 8

[e] quantitative

3 [a] 50 students [b] 80 students

[c]



Answers of TIMSS Questions

First :

(1) a	(2) d	(3) b	(4) d	(5) c
(6) b	(7) b	(8) c	(9) b	(10) b
(11) b	(12) d	(13) b	(14) d	(15) a
(16) a	(17) a	(18) c	(19) b	(20) a
(21) d	(22) c	(23) b	(24) d	(25) b
(26) c	(27) a	(28) c	(29) c	(30) d
(31) a	(32) c	(33) b	(34) a	(35) c
(36) b	(37) c	(38) c	(39) a	(40) c
(41) b	(42) b	(43) d	(44) b	(45) c

Second :

(1) Where the pentagon ABCDE consists of 3 triangles , then the sum of all the interior angles of the pentagon ABCDE = 3 × 180°
= 540°

(2) 5 000

(3) The numbers are :
$y + 7$, $y + 9$, $y + 11$ and $y + 13$

(4) The circumference of the circle
$= 2 \times 10.5 \times \frac{22}{7} = 66$ cm.
The perimeter of the square $= \frac{1}{3} \times 66$
$= 22$ cm.
The side length of the square
$= \frac{\text{The perimeter}}{4} = \frac{22}{4} = 5.5$ cm.

(5) The number of red balls $= \frac{1}{6} \times 18 = 3$ balls
The number of blue balls $= \frac{1}{3} \times 18 = 6$ balls
The number of green balls $= 18 - 3 - 6$
$= 9$ balls
The green colour has the greatest chance to be drawn.

Guide Answers of Worksheets



First — Worksheets on unit 1 and unit 2

Sheet 1

1

[a] 1 : 6 [b] 24 [c] 1 : 4

[d] $\frac{3}{5}$ [e] 1 : 4

2

[a] a way of comparing between two quantities by division.

[b] 9 , 17 [c] 1 : 2 π

[d] 1 : 5 [e] 3 : 1

3

[a] 5 : 9 [b] 4 : 5 [c] 9 : 4

4

[a] The number of boys = 200 − 80 = 120 boys.
the ratio between the number of boys and the number of girls = 120 : 80 = 3 : 2

[b] (1) $5 : \frac{5}{4}$ (× 4)
20 : 5 (÷ 5)
4 : 1

(2) $2\frac{2}{3} : 1\frac{1}{3}$
$\frac{8}{3} : \frac{4}{3}$ (× 3)
8 : 4 (÷ 4)
2 : 1

(3) $\frac{1}{3}$: 0.2
$\frac{1}{3} : \frac{2}{10}$ (× 30)
10 : 6 (÷ 2)
5 : 3

(4) $\frac{15}{45}$ = 15 : 45 = 1 : 3

5

[a] The perimeter of the square = 4 × 2 = 8 cm.
the perimeter of the rectangle
= 2 (4 + 6) = 20 cm.
the ratio between the perimeter of the square and the perimeter of the rectangle.
= 8 : 20 = 2 : 5

[b] The area of the square = 2 × 2 = 4 cm²
the area of the rectangle = 4 × 6 = 24 cm²
the ratio between the area of the square and the area of the rectangle
= 4 : 24 = 1 : 6

Sheet 2

1

[a] 3 : 4 [b] 1 : 2 [c] 1 : 3

[d] 1 : 1 [e] 2

2

[a] 1 : π [b] 5 : 4 [c] 2 : 3

[d] 8 : 9 [e] 3 : 4

3

[a] 6 days : 2 weeks
6 days : 14 days
6 : 14 (÷ 2)
3 : 7

[b] 5 dm. : 5 m.
5 dm. : 50 dm.
5 : 50 (÷ 5)
1 : 10

[c] 5 kg. : 7 000 gm.
5 000 gm. : 7 000 gm.
5 000 : 7 000 (÷ 1 000)
5 : 7

[d] $\frac{1}{2}$ L. : 250 mL.
500 mL. : 250 mL.
500 : 250 (÷ 250)
2 : 1

4

The ratio between the two distances
= 350 m. : 1.4 km.
= 350 : 1 400 (÷ 10)
= 35 : 140 (÷ 7)
= 5 : 20 (÷ 5)
= 1 : 4

5 The area of the triangle ABC = $\frac{1}{2}$ × 3 × 8
= 12 cm²
The area of the parallelogram LMNO
= 3 × 5 = 15 cm²

The ratio between the area of the triangle ABC and the area of the parallelogram LMNO

= 12 cm^2 : 15 cm^2

= 12 : 15 (÷ 3)

= 4 : 5

Sheet 3

1

[a] 160 [b] $\frac{\text{the first number}}{\text{the second number}}$

[c] 3 : 4 [d] 15 ، 6 [e] 1 : 5

2 Boys : Girls

2 : 3

12 : ?

The number of girls = $\frac{3 \times 12}{2}$ = 18 girls.

3

[a] 1 [b] 8 : 5 [c] 24

[d] 6 [e] 15

4 First amount : Second amount : Sum

2 : 7 : 9

? : ? : 1800

The first amount = $\frac{2 \times 1\,800}{9}$ = L.E. 400

The second amount = $\frac{7 \times 1\,800}{9}$ = L.E. 1400

5 Length : Width : Difference

7 : 4 : 3

? : ? : 21

The length = $\frac{7 \times 21}{3}$ = 49 cm.

The width = $\frac{4 \times 21}{3}$ = 28 cm.

The area of the rectangle

= 49 × 28 = 1372 cm^2

Sheet 4

1

[a] 2 : 3 : 5 [b] 5 : 10 : 7 [c] 5 : 7 : 9

[d] 6 : 10 : 25 [e] 1 : 4

2

[a] First angle : Second angle : Third angle : Sum

3 : 4 : 5 : 12

? : ? : ? : 180°

The measure of first angle = $\frac{3 \times 180°}{12}$ = 45°

The measure of second angle = $\frac{4 \times 180°}{12}$ = 60°

The measure of third angle = $\frac{5 \times 180°}{12}$ = 75°

[b] First number : Second number : Sum

5 : 6 : 11

? : ? : 297

First number = $\frac{5 \times 297}{11}$ = 135

Second number = $\frac{6 \times 297}{11}$ = 162

3

[a] 5 : 8 [b] 6 : 4 : 3 [c] 1 : 3

[d] 35 [e] 3

4

[a] 1^{st} side : 2^{nd} side : 3^{rd} side : Sum

4 : 6 : 7 : 17

? : ? : ? : 51

The length of 1^{st} side = $\frac{4 \times 51}{17}$ = 12 cm.

The length of 2^{nd} side = $\frac{6 \times 51}{17}$ = 18 cm.

The length of 3^{rd} side = $\frac{7 \times 51}{17}$ = 21 cm.

[b] Adam's money : Nada's money : Seif's money : Difference

6 : 5 : 2 : 4

? : ? : ? : 200

Adam's money = $\frac{6 \times 200}{4}$ = L.E. 300

Nada's money = $\frac{5 \times 200}{4}$ = L.E. 250

Seif's money = $\frac{2 \times 200}{4}$ = L.E. 100

5 Mohamed : Hany : Amr : Sum

1 : 2 : :

3 : 2

3 : 6 : 4 : 13

? : ? : ? : 988

The share of Mohamed = $\frac{3 \times 988}{13}$ = L.E. 228

The share of Hany = $\frac{6 \times 988}{13}$ = L.E. 456

The share of Amr = $\frac{4 \times 988}{13}$ = L.E. 304

Sheet 5

1 [a] 4 [b] 500 [c] 200 [d] 2

2

[a] The average speed = $\frac{270}{3}$ = 90 km./ hr.

[b] Boys : Girls : Sum

6 : 7 : 13

? : ? : 260

The number of boys = $\frac{6 \times 260}{13}$ = 120 boys.

The number of girls = $\frac{7 \times 260}{13}$ = 140 girls.

3

[a] Bassem : Mina : Amgad

3 : 4 : 5

24 : ? : ?

The share of Mina = $\frac{4 \times 24}{3}$ = L.E. 32

The share of Amgad = $\frac{5 \times 24}{3}$ = L.E. 40

[b] The production rate of the factory

= $\frac{200}{10}$ = 20 bottles/hour.

4

[a] The rate of production of the machine

= $\frac{450}{3}$ = 150 kg./ hr.

[b] The rate of the worker = $\frac{45}{5}$ = 9 m^2 / hr.

What the worker paint in 7 hours

= 7 × 9 = 63 m^2

5

[a] 1^{st} building : 2^{nd} building

3 : 7

? : 35

The height of 1^{st} building = $\frac{3 \times 35}{7}$ = 15 m.

[b] The rate of consumption

= $\frac{160}{240}$ = $\frac{2}{3}$ litre / km.

Sheet 6

1

[a] an equality of two or more ratios.

[b] $\frac{7}{12} = \frac{28}{48} = \frac{21}{36}$ [c] $\frac{8}{24} = \frac{1}{3} = \frac{5}{15}$

[d] $\frac{4}{6} = \frac{12}{18} = \frac{6}{9} = \frac{2}{3}$ [e] 3 : 5

2

Petrol in litre	12	8	36
Distance in km.	150	100	**450**

3

1.3	0.5	1	3	4.5	5.5	0.67
13	5	10	30	45	55	6.7

4

The number of boys = 400 – 250 = 150 boys.

[a] 5 : 3 [b] 3 : 8

5

The rate of the machine = $\frac{16}{4}$ = 4 units / hr.

The machine takes = $\frac{25}{4}$ = 6.25 hr.

Sheet 7

1

[a] the means [b] 24

[c] 4 ، second [d] 27 [e] b × x

2

[a] 44 [b] 15 [c] 8 [d] 3

3

[a] 4 [b] 6 [c] 7

[d] 3 : 4 [e] $\frac{4}{3}$

4

[a] Litre : km.

20 : 180

? : 540

The number of litres = $\frac{20 \times 540}{180}$ = 60 litres.

[b] 1^{st} building : 2^{nd} building : 3^{rd} building

3	:	4	:	5
21	:	?	:	?

The height of the second building $= \frac{4 \times 21}{3} = 28$ m.

The height of the third building $= \frac{5 \times 21}{3} = 35$ m.

5

m.	:	hour
1 400	:	2
4 900	:	?

The needed time $= \frac{4\,900 \times 2}{1\,400} = 7$ hours.

Sheet 8

1

[a] $\frac{\text{length in drawing}}{\text{length in reality}}$ [b] 6

[c] 1 : 1 000 [d] 5 , 13 [e] reduction

2

[a] The drawing scale $= \frac{4}{2\,000\,000} = 1 : 500\,000$

It means that every 1 cm. on the map represents 5 km. in reality.

[b] The ratio of magnification $= \frac{20}{0.4} = 50 : 1$

3

[a] The drawing scale $= \frac{13}{18\,720} = 1 : 1\,440$

[b] Length in drawing : Length in reality

1	:	1 440
3.5	:	?

The real length of the building $= \frac{3.5 \times 1\,440}{1} = 5\,040$ cm. $= 50.4$ m.

4

[a] 1^{st} factory : 2^{nd} factory : 3^{rd} factory : Sum

3	:	2	:	1	:	6
?	:	?	:	?	:	9 600

The production of the 1^{st} factory $= \frac{3 \times 9\,600}{6} = 4\,800$ sets.

The production of the 2^{nd} factory $= \frac{2 \times 9\,600}{6} = 3\,200$ sets.

The production of the 3^{rd} factory $= \frac{1 \times 9\,600}{6} = 1\,600$ sets.

[b] Length in drawing : Length in reality

1	:	3 000
3.6	:	?

The length of the first dimension $= \frac{3.6 \times 3\,000}{1} = 10\,800$ cm. $= 108$ m.

Length in drawing : Length in reality

1	:	3 000
2	:	?

The length of the second dimension $= \frac{2 \times 3\,000}{1} = 6\,000$ cm. $= 60$ m.

The real area of the garden $= 108 \times 60 = 6\,480$ m^2

5

[a] Length in drawing : Length in reality

1	:	500 000
?	:	22 000 000

The map distance $= \frac{22\,000\,000}{500\,000} = 44$ cm.

[b] Length in picture : Length in reality

200	:	1
?	:	0.14

Length in picture $= \frac{200 \times 0.14}{1} = 28$ mm.

Sheet 9

1

[a] 1^{st} : 2^{nd} : 3^{rd} : Sum

5	:	3	:	4	:	12
?	:	?	:	?	:	360

The 1^{st} person's share $= \frac{5 \times 360}{12} =$ L.E.150

The 2^{nd} person's share $= \frac{3 \times 360}{12} =$ L.E.90

The 3^{rd} person's share $= \frac{4 \times 360}{12} =$ L.E.120

[b] 1^{st} number : 2^{nd} number : Difference

5	:	7	:	2
?	:	?	:	12

The 1^{st} number $= \frac{5 \times 12}{2} = 30$

The 2^{nd} number $= \frac{7 \times 12}{2} = 42$

2

1^{st}	:	2^{nd}	:	3^{rd}	:	Sum
15 000	:	25 000	:	20 000	:	(÷ 1 000)
15	:	25	:	20	:	(÷ 5)
3	:	5	:	4	:	12
?	:	?	:	?	:	5 520

The 1^{st} person's share $= \frac{3 \times 5\,520}{12} =$ L.E. 1 380

The 2^{nd} person's share $= \frac{5 \times 5\,520}{12} =$ L.E. 2 300

The 3^{rd} person's share $= \frac{4 \times 5\,520}{12} =$ L.E. 1 840

3

[a] Length in drawing : Length in reality

1	:	1 000 000
5	:	?

The real distance $= \frac{5 \times 1\,000\,000}{1} = 5\,000\,000$ cm. $= 50$ km.

[b] 1^{st} factory : 2^{nd} factory : 3^{rd} factory

5	:	4	:	3
?	:	?	:	3 600

The production of first factory $= \frac{5 \times 3\,600}{3} = 6\,000$ machines.

The production of second factory $= \frac{4 \times 3\,600}{3} = 4\,800$ machines.

4

First	:	Second	:	Third	:	Sum
2	:	3	:		:	
		1	:	2	:	
2	:	3	:	6	:	11
?	:	?	:	?	:	330

The share of first $= \frac{2 \times 330}{11} = 60$ kg.

The share of second $= \frac{3 \times 330}{11} = 90$ kg.

The share of third $= \frac{6 \times 330}{11} = 180$ kg.

5

The share of the wife $= \frac{1}{8} \times 192 = 24$ feddans.

The remainder $= 192 - 24 = 168$ feddans.

, if the share of one daughter = 1 part ,

the share of the son = 2 parts

, then the total number of equal parts $= 3 \times 1 + 2 \times 2 = 7$

The value of each part $= \frac{168}{7} = 24$ feddans.

The share of each son $= 24 \times 2 = 48$ feddans.

The share of each daughter $= 24 \times 1 = 24$ feddans.

Sheet 10

1

[a] a ratio its second term is 100

[b] 24 [c] 175 [d] $\frac{7}{10}$ [e] 45

2

[a] $0.07 = \frac{7}{100} = 7\%$

[b] $\frac{3}{5} = \frac{3}{5} \times 100\% = 60\%$

[c] $\frac{9}{20} = \frac{9}{20} \times 100\% = 45\%$

[d] $0.6 = \frac{6}{10} = \frac{60}{100} = 60\%$

3

Since $\frac{x}{40} = \frac{35}{100}$ So , $x = \frac{35 \times 40}{100} = 14$

4

[a] The percentage of absentees $= \frac{6}{48} \times 100\% = 12.5\%$

The percentage of attendance $= 100\% - 12.5\% = 87.5\%$

[b]

Heba	:	Hend	:	Nada	:	Nada – Heba	:	Total
2	:	3	:	4	:	2	:	9
	:		:		:	15	:	?

The total amount of money $= \frac{9 \times 15}{2} =$ L.E. 67.5

5

[a] The percentage = $\frac{117}{936} \times 100\% = 12.5\%$

[b] The drawing scale = $\frac{\text{length in drawing}}{\text{length in reality}}$ = $\frac{8}{4\,000\,000}$ = 1 : 500 000

Sheet 11

1

[a] 70 [b] 12 [c] 135

[d] 20 [e] 63 000

2

[a]

C.P.	Profit	S.P.
100	10	110
?		550

The C.P. = $\frac{100 \times 550}{110}$ = L.E. 500

[b]

Original	Shrinking	After shrinking
100	5	95
10		?

The length after shrinking = $\frac{10 \times 95}{100}$ = 9.5 m.

3

[a] The percentage of the left distance = 100% – (42% + 28%) = 30%

The left distance = 30% × 120 = 36 km.

[b]

Deposit	Interest	Total
100	11	111
3 000		?

The total amount after one year = $\frac{3\,000 \times 111}{100}$ = L.E. 3 330

4

[a] The discount value = 1 450 – 1 160 = L.E.290

The discount percentage = $\frac{290}{1\,450} \times 100\%$ = 20 %

[b]

XY	YZ	ZX	Perimeter
4	5	7	16
		28	?

The perimeter = $\frac{28 \times 16}{7}$ = 64 cm.

5

The cost price = 960 + 20 = L.E. 980

C.P.	Profit	S.P.
100	20	120
980		?

The S.P. = $\frac{980 \times 120}{100}$ = L.E.1 176

Second Worksheets on unit 3 and unit 4

Sheet 1

1

[a] square , rectangle [b] 130°

[c] equal in length [d] rectangle

[e] a square

2

m (∠ ADC) = 120°

The length of $\overline{DC}$ = 5 cm.

The length of $\overline{AD}$ = 7 cm.

3 AB = 3 cm. , BC = 5 cm. , AC = 5 cm.

4

(1) The length of $\overline{BD}$ = 8 cm.

(2) The perimeter of △ ABM = 4 + 4 + 3 = 11 cm.

5

[a] (1) m (∠ A) = 60° , m (∠ ABD) = 60°

(2) equilateral triangle

(3) The perimeter = 4 × 7 = 28 cm.

[b] (1) m (∠ ABD) = 82°

(2) m (∠ ADC) = 127°

(3) AC = 12 cm.

Sheet 2

1

[a] [b] [c]

[d] [e]

2

[a] square [b] [c] 3

[d] [e] rectangle

3

[a] 2 X = 60° , then X = 30°

, y + 10° = 180° – 60° = 120°

, then y = 110°

[b]

4

[a] m (∠ D) = 100°

[b] m (∠ ACD) = 180° – (100° + 30°) = 50°

[c] The length of $\overline{AD}$ = 5 cm.

5

[a] [b]

[c]

Sheet 3

1

Fig. (1) : 13 Fig. (2) : 10 Fig. (3) : 9

2

[a] equal in area , parallel [b] 12 , 8

[c] 17 000 [d] cube

[e] the volume of a cube whose edge length is 1 cm.

3

[a] 180° [b] 6 [c] 3.25

[d] 7 000 [e] equal in length

4

m (∠ ADC) = 110°

, the perimeter of △ BCD = 7 + 6 + 3.8 + 3.8 = 20.6 cm.

5

[a] The order is : 50 dm³ , 500 000 cm³ and 5 m³.

[b] (1) The perimeter of figure ABCD = 4 × 7 = 28 cm.

(2) m (∠ ABC) = 180° – 60° = 120°

Sheet 4

1

[a] base area [b] 240 [c] 3 960 cm³

[d] volume of cuboid , height

[e] rectangle , square

2

[a] (1) m (∠ ABC) = 120°

(2) The perimeter = 5 + 3 + 5 + 3 = 16 cm.

[b] The volume of the box = 12 × 6 × 18 = 1296 cm³

The volume of each piece = 2 × 1 × 3 = 6 cm³

The number of pieces = 1 296 ÷ 6 = 216 pieces.

3

[a] 6.5 [b] 6 [c] 6

[d] 3 [e] volume

4

1st dimension	2nd dimension	3rd dimension	Sum
2	3	5	10
?	?	?	240

The first dimension = $\frac{2 \times 240}{10}$ = 48 cm.

The second dimension = $\frac{3 \times 240}{10}$ = 72 cm.



The third dimension = $\frac{5 \times 240}{10}$ = 120 cm.

The volume of the cuboid = 48 × 72 × 120 = 414 720 cm^3.

5

The base area = 20 × 20 = 400 cm^2.

The height of water = $\frac{3\ 600}{400}$ = 9 cm.

Sheet 5

1

[a] edge length , itself , itself [b] 216

[c] 27 [d] 125 cm^3

[e] 8 cm^3

2

[a] 10 000 [b] 5 [c] 8

[d] rhombus [e] 490 cm^3

3

[a] The volume of the cube = 5 × 5 × 5 = 125 cm^3

The volume of the cuboid = 6 × 5 × 4 = 120 cm^3

The volume of the cube is greater.

[b] The volume of the cuboid = 56 × 21 × 7 = 8 232 cm^3

The volume of the cube = 14 × 14 × 14 = 2 744 cm^3

The number of the cubes = 8 232 ÷ 2 744 = 3 cubes.

4

The volume of the box = 54 × 60 × 30 = 97 200 cm^3

The volume of each packet = 6 × 6 × 6 = 216 cm^3

The number of packets = $\frac{97\ 200}{216}$ = 450 packets.

5

(1) m (∠ BCD) = 53°

(2) The perimeter of Δ DBC = 6 + 8 + 5 = 19 cm.

Sheet 6

1

[a] capacity [b] 4 400 [c] 3

[d] 450 [e] 0.68

2

[a] 12 [b] 750 [c] length

[d] 38 [e] rhombus

3

[a] The capacity of the tin = 30 × 25 × 40 = 30 000 cm^3 = 30 litres.

The price of the oil = 30 × 3.5 = L.E. 105

[b] The capacity of the tin = 40 × 40 × 40 = 64 000 cm^3 = 64 litres.

The number of needed bottles = 64 ÷ $\frac{1}{2}$ = 128 bottles.

4

[a] The number of small bottles = 750 ÷ 25 = 30 bottles

[b] The base area = 20 × 20 = 400 cm^2

The height of water = $\frac{3\ 600}{400}$ = 9 cm.

5

[a] The volume of a brick = 0.25 × 0.12 × 0.06 = 0.0018 m^3

The volume of the wall = 0.0018 × 1 500 = 2.7 m^3

[b] The edge length of cube = $\frac{18}{3}$ = 6 cm.

The volume of cube = 6 × 6 × 6 = 216 cm^3

Sheet 7

1

[a] descriptive data [b] quantitative data

[c] cube [d] edge

[e] quantitative

2

[a] age [b] blood species

[c] 64 [d] 4

[e] 0.85

3

The descriptive data : Scent of women and made in France

The quantitative data : 50 mL. and price L.E. 180

4 Half of the perimeter = $\frac{80}{2}$ = 40 cm.

Length	Width	Sum
5	3	8
?	?	40

The length = $\frac{5 \times 40}{8}$ = 25 cm.

The width = $\frac{3 \times 40}{8}$ = 15 cm.

The volume = 25 × 15 × 7 = 2 625 cm^3.

5

[a] (1) Age and membership number.

(2) Name , job , personal photo and library stamp.

[b] (1) m (∠ D) = 100°

(2) m (∠ BAD) = 180° – 100° = 80° ,

m (∠ BAC) = $\frac{80°}{2}$ = 40°

Sheet 8

1

[a]

Sport	Tally	Frequency
Football	𝍸𝍸 //	12
Volleyball	//	2
Basketball	//	2
Swimming	𝍸 ///	8
Tennis	𝍸	5
Walking	𝍸 /	6
Gymnastics	/	1
Total		36

Sport	Football	Volleyball	Basketball	Swimming	Tennis	Walking	Gymnastics	Total
Frequency	12	2	2	8	5	6	1	36

[b] The number of pupils who prefer tennis = 5 pupils

2

[a] The vegetable that has the greatest number of produced tons is potato and its order is the fifth.

[b] The number of produced tons of tomato = 20 tons

and its percentage = $\frac{20}{80}$ × 100% = 25%

3

[a] (1) 35° (2) 35° (3) 27° (4) 118°

[b] The volume of the cube = 30 × 30 × 30 = 27 000 cm^3

The volume of the cuboid = the volume of the cube = 27 000 cm^3

The base area of the cuboid = 40 × 25 = 1 000 cm^2

The height of cuboid = $\frac{27\ 000}{1\ 000}$ = 27 cm.

4

[a]

Evaluation	Tally	Frequency
Very weak	/	1
Weak	///	3
Pass	𝍸 //	7
Good	𝍸 /	6
Very good	//	2
Excellent	/	1
Total		20

Evaluation	Very Weak	Weak	Pass	Good	Very good	Excellent	Total
Frequency	1	3	7	6	2	1	20

[b] The most common evaluation is pass.

[c] The least common evaluations are very weak and excellent.

5

[a] 3 metres = 3 × 100 = 300 cm.

The area of the base = $\frac{24\ 000}{300}$ = 80 cm^2

[b] The volume of the cube = 9 × 9 × 9 = 729 cm^3

The volume of the cuboid = 8 × 9 × 10 = 720 cm^3

The cube is greater in volume.

Sheet 9

1

[a] the range [b] 17 [c] 50

[d] rectangle [e] 100

Answers of worksheets

2

Sets	Tally	Frequency
11 –	~~||||~~ ~~||||~~	10
16 –	||||	4
21 –	~~||||~~ ~~||||~~ |||	13
26 –	~~||||~~ ~~||||~~ |||	13
Total		40

Sets	Frequency
11 –	10
16 –	4
21 –	13
26 –	13
Total	40

The number of workers = 26

3

[a] The number of workers whose wages are less than L.E. 16 = 25 workers.

[b] The percentage = $\frac{6}{50} \times 100\% = 12\%$

4

[a]

Sets	10 –	20 –	30 –	40 –	50 –	Total
Frequency	4	8	12	10	6	40

[b] The number of pupils whose marks are less than 40 = 24 pupils and their percentage = $\frac{24}{40} \times 100\% = 60\%$

5

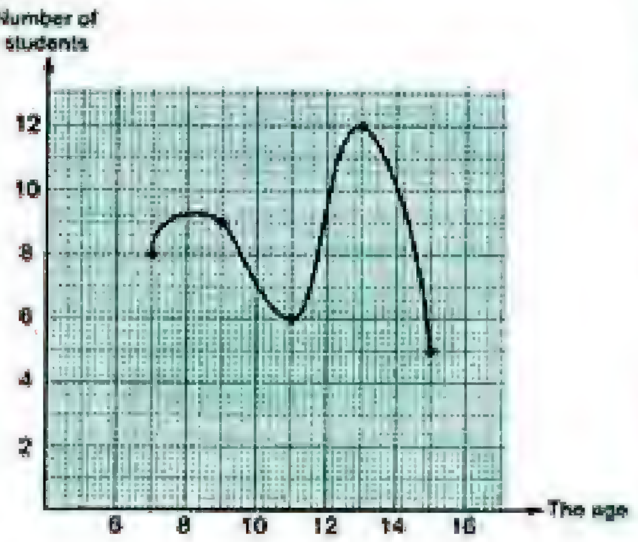
[a] The volume of the metallic piece $= 20 \times 20 \times 3 = 1\,200$ cm^3.

[b] (1) The capacity of the vessel $= 20 \times 20 \times 20 = 8\,000$ cm^3 $= 8\,000 \div 1\,000 = 8$ litres.

(2) The price of all oil $= 8 \times 14 = 112$ pounds.

Sheet 10

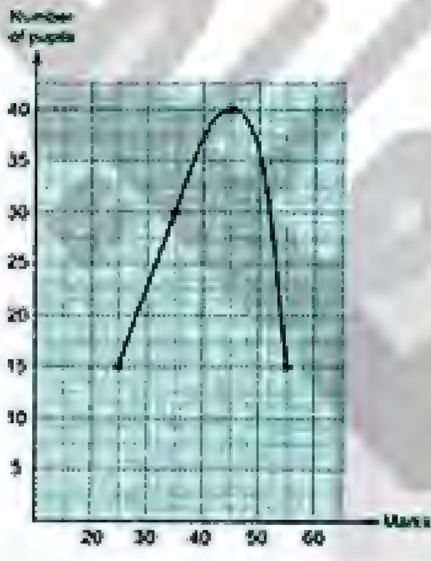
1



2

[a] 45 pupils

[b]



3

[a] Perpendicular [b] 300 [c]

[d] 58

[e] 7

4

[a] The area of one face $= 54 \div 6 = 9$ cm^2 $= (3 \times 3)$ cm^2

The edge length = 3 cm.

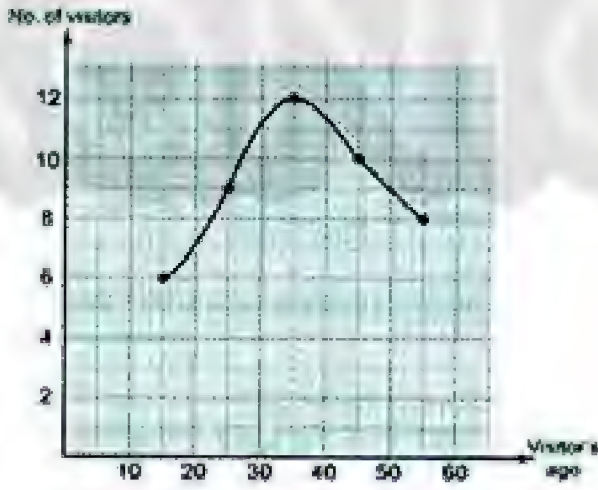
The volume $= 3 \times 3 \times 3 = 27$ cm^3.

[b] The capacity of each tin $= 18 \times 10 \times 16 = 2\,880$ cm^3.

The number of tins $= 72\,000 \div 2\,880 = 25$ tins.

5 (1) 27 visitors.

(2)



Guide Answers of Final Examinations



Answers of model examinations of the school book

Model 1

1 (1) 2.5 (2) 4 (3) 150 : 1
(4) The base length , the height

2 (1) 6 (2) 0.75 (3) 6 (4) 45°

3 [a] The volume of oil = 12 × 1 000
= 12 000 cm^3

The number of bottles = $\frac{12\ 000}{400}$
= 30 bottles.

[b]

C.P.	:	Profit	:	S.P.
100 %	:	12 %	:	112 %
72 000	:		:	?

The selling price = $\frac{72\ 000 \times 112\ \%}{100\ \%}$
= L.E. 80 640

4 [a]

1st angle	:	2nd angle	:	3rd angle	:	Sum
2	:	3	:	4	:	9
?	:	?	:	?	:	180°

The measure of the first angle
= $\frac{2 \times 180^\circ}{9}$ = 40°

The measure of the second angle
= $\frac{3 \times 180^\circ}{9}$ = 60°

The measure of the third angle
= $\frac{4 \times 180^\circ}{9}$ = 80°

[b] The volume of the cube = 12 × 12 × 12
= 1 728 cm^3

The volume of the an ingot = 3 × 4 × 6
= 72 cm^3

The number of ingots = 1 728 ÷ 72
= 24 ingots.

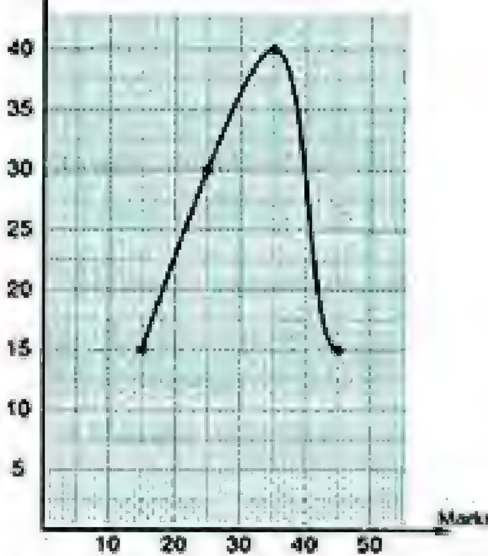
5 [a]

1st person	:	2nd person	:	Sum
5 000	:	8 000	:	(÷ 1 000)
5	:	8	:	13
?	:	?	:	3 900

The share of the first person
= $\frac{5 \times 3\ 900}{13}$ = 1 500 pounds.

The share of the second person
= $\frac{8 \times 3\ 900}{13}$ = 2 400 pounds.

[b]



Model 2

1 (1) rectangle (2) $4\frac{4}{5}$ (3) 28 (4) 20

2 (1) 65 (2) 271 (3) 40 (4) 1 : 120

3 [a]

1st person	:	2nd person	:	3rd person	:	Sum
15 000	:	25 000	:	20 000	:	(÷ 1 000)
15	:	25	:	20	:	(÷ 5)
3	:	5	:	4	:	12
?	:	?	:	?	:	5 520

The profit share of the first person
= $\frac{3 \times 5\ 520}{12}$ = 1 380 pounds.

The profit share of the second person
= $\frac{5 \times 5\ 520}{12}$ = 2 300 pounds.

The profit share of the third person
= $\frac{4 \times 5\ 520}{12}$ = 1 840 pounds.

[b] The volume of the water = 10 × 1 000
= 10 000 cm^3

The base area of cuboid = 25 × 25
= 625 cm^2

The height of water = $\frac{10\ 000}{625}$ = 16 cm.

4 [a]

Boys	:	Girls	:	Sum
1	:	2	:	3
?	:	?	:	360

The number of boys = $\frac{1 \times 360}{3}$ = 120 boys.

The number of girls = $\frac{2 \times 360}{3}$ = 240 girls.

[b] m (∠ ADC) = 180° – 70° = 110°

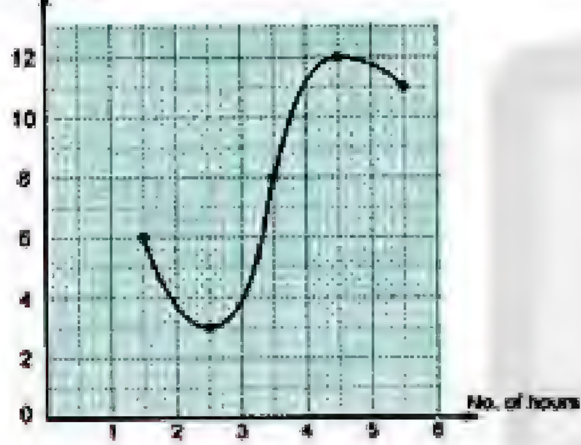
, The perimeter of triangle BCD = 7 + 6 + 7.6 = 20.6 cm.

5 [a]

Price before discount	:	Discount	:	Price after discount
100 %	:	15 %	:	85 %
?	:	?	:	660

The price before discount = $\frac{100\% \times 660}{85\%}$ ≃ 776 pounds.

[b]



Model examination for the special needs students

1 (1) 5 : 8 (2) 30 (3) height (4) 3 000

2 (1) 30 (2) 15 (3) square (4) 1 : 100

3 (1) 12
(2) minimization
(3) 1 : 4
(4) 90°

4 (1) (✓) (2) (✗) (3) (✓) (4) (✗)

5 [a] (1) 2 : 5 (2) 100°
[b] (1) 6 (2) 14

Answers of Governorates Examinations for the Year 2017

1 Cairo (2017)

1 [a] 6 [b] 40
[c] rectangle , square [d] range

2 [a] 4 [b] age [c] 1.5 [d] 4

3 [a]

Length in drawing	:	Length in reality
1	:	500 000
3	:	?

The red distance = $\frac{3 \times 500\,000}{1}$ = 1 500 000 cm. = 15 km.

[b] (1) The area of one face = 54 ÷ 6 = 9 cm^2 = (3 × 3) cm^2

The edge length = 3 cm.

(2) The volume = 3 × 3 × 3 = 27 cm^3.

4 [a]

1st	:	2nd	:	3rd	:	Sum
5	:	4	:	3	:	12
?	:	?	:	?	:	240

The number of pupils in 1st grade = $\frac{5 \times 240}{12}$ = 100 pupils

The number of pupils in 2nd grade = $\frac{4 \times 240}{12}$ = 80 pupils

The number of pupils in 3rd grade = $\frac{3 \times 240}{12}$ = 60 pupils

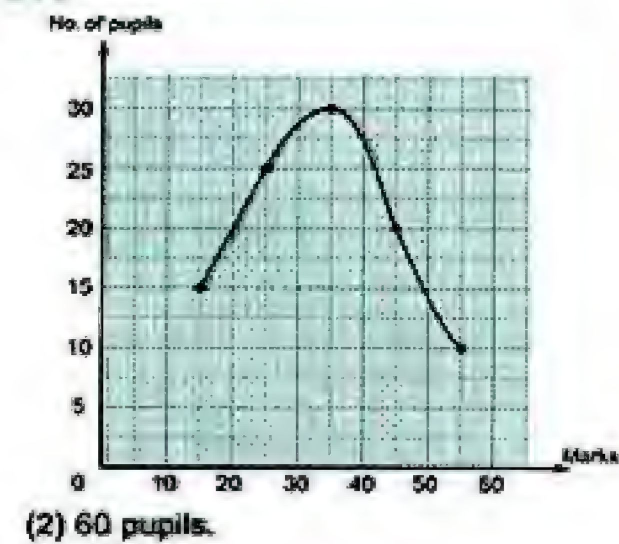
[b]

Price before discount	:	Discount	:	Price after discount
100 %	:	15 %	:	85 %
?	:		:	425

The original price = $\frac{100 \times 425}{85}$ = L.E. 500

5 [a] (1) The length of $\overline{CD}$ = 5 cm.
(2) m (∠ BAC) = 40°

[b] (1)



(2) 60 pupils.

2 Giza (2017)

1 [a] 70 % [b] 6
[c] rectangle , square [d] reduction

2 [a] 2 : 9 [b] 27
[c] 6 [d] favorite colour

3 [a]

Length in drawing	:	Length in reality
1	:	1 100 000
15	:	?

The real length = $\frac{15 \times 1\,100\,000}{1}$ = 16 500 000 cm. = 165 km.

[b] The rate = $\frac{20}{5}$ = 4 litres/hr.

Advise by yourself.

4 [a] The capacity = 40 × 30 × 1.8 = 2 160 m^3 = 2 160 000 litres

[b]

Girls	:	Boys	:	Sum
3	:	5	:	8
?	:	?	:	560

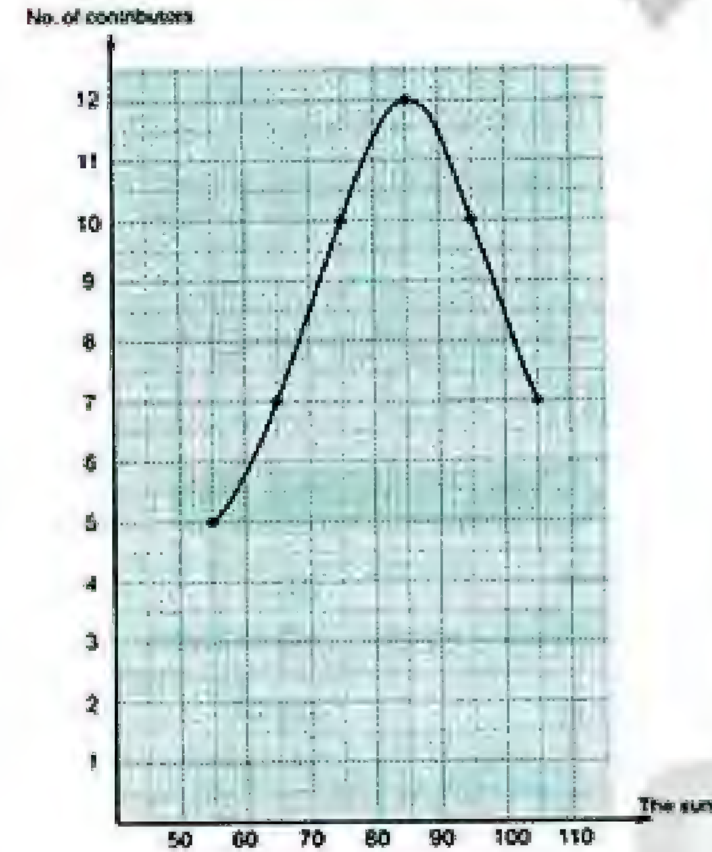
The number of girls = $\frac{3 \times 560}{8}$ = 210 girls

The number of boys = $\frac{5 \times 560}{8}$ = 350 boys

5 [a] (1) m (∠ D) = 130°

(2) m (∠ BAC) = 25°

[b] (1)



(2) 29 contributors.

3 Alexandria (2017)

1 [a] 0.125 [b] 6

[c] 4.2 [d] favorite food

2 [a] 8 [b] 5 : 7 [c] 40 [d] square

3 [a] Boys : Girls : Sum

4 : 5 : 9

16 : : ?

The number of pupils $= \frac{16 \times 9}{4}$

= 36 pupils

[b] Length in drawing : Length in reality

1 : 40

? : 160

The length in the picture $= \frac{1 \times 160}{40} = 4$ cm.

4 [a] Buying price : Profit : Selling price

100 % : 15 % : 115 %

? : ? : 21 520

The buying price $= \frac{100 \times 21\,520}{115}$

$=$ L.E. $18\,713 \frac{1}{23}$

$\simeq$ L.E. 18 713

The profit $= \frac{15 \times 21\,520}{115} =$ L.E. $2\,806 \frac{22}{23}$

$\simeq$ L.E. 2 807

[b] The volume of cube = 12 × 12 × 12

$= 1\,728$ cm^3

The volume of an alloy = 3 × 4 × 6

$= 72$ cm^3

The number of alloys $= \frac{1\,728}{72} = 24$ alloys

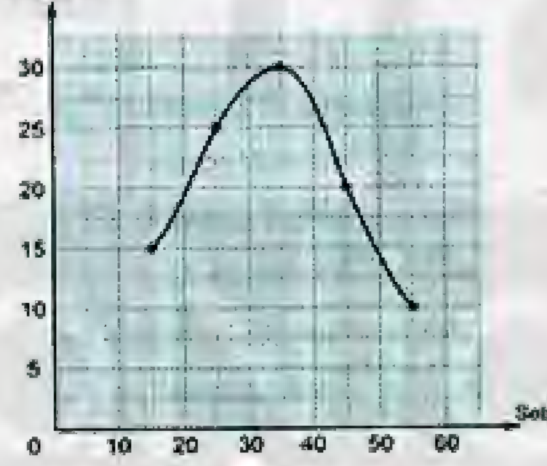
5 [a] (1) The capacity = 30 × 30 × 30

$= 27\,000$ cm^3

= 27 litres

(2) The price = 27 × 9.5 = 256.5 pounds

[b]



4 El-Kalyoubia (2017)

1 [a] 4 : 7 : 9 [b] 6

[c] 18 : 1 [d] diameter length × π

2 [a] 4 [b] 729

[c] 500 [d] 1 : 200

3 [a] Building : Tower

4 : 20

36 : ?

The height of the tower $= \frac{20 \times 36}{4} = 180$ m.

[b] (1) Length in drawing : Length in reality

1 : 500

2 : ?

The first dimension in reality

$= \frac{2 \times 500}{1} = 1\,000$ cm. = 10 m.

Length in drawing : Length in reality

1 : 500

4 : ?

The second dimension in reality

$= \frac{4 \times 500}{1} = 2\,000$ cm. = 20 m.

(2) The real area of playground = 10 × 20

$= 200$ m^2

4 [a] (1) DE , 4 (2) 3 (3) 12

[b] The capacity = 40 × 30 × 1.8 = 2 160 m^3

= 2 160 000 litres

5 [a] A : C : Sum

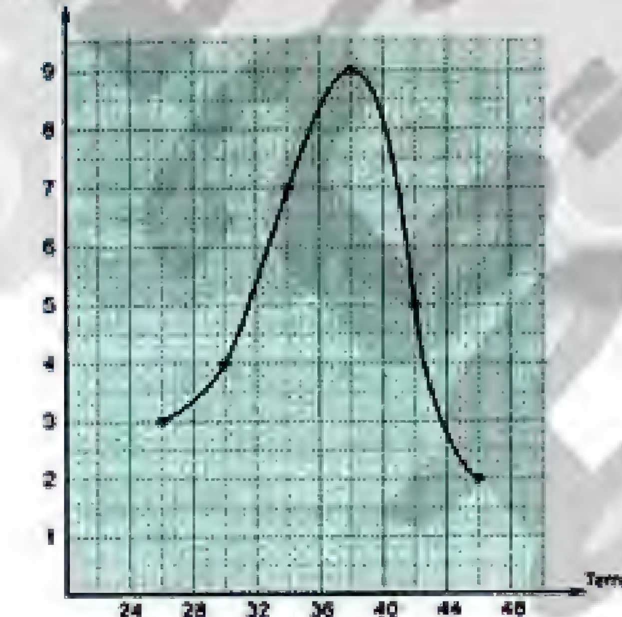
2 : 3 : 5

? : ? : 90

The measure of ∠ A $= \frac{2 \times 90}{5} = 36°$

The measure of ∠ C $= \frac{3 \times 90}{5} = 54°$

[b]



5 El-Sharkia (2017)

1 [a] 2 [b] 28 [c] age [d] 2

2 [a] 9 [b] 1 : 3 [c] 48 [d] 10

3 [a] The share of the first son

$= \frac{1}{3} \times 6\,300 = 2\,100$ pounds.

The rest = 6 300 − 2 100 = 4 200 pounds.

2nd son : 3rd son : Sum

3 : 2 : 5

? : ? : 4 200

The share of second son $= \frac{3 \times 4\,200}{5}$

= 2 520 pounds.

The share of third son $= \frac{2 \times 4\,200}{5}$

= 1 680 pounds.

[b] Length in drawing : Length in reality

1 : 9 000 000

? : 180 km.

The distance on the map

$= \frac{1 \times 180 \times 100\,000}{9\,000\,000} = 2$ cm.

4 [a] Price before discount : Discount : Price after discount

100 % : 10 % : 90 %

? : : 4 500

The price before discount $= \frac{100 \times 4\,500}{90}$

= L.E. 5 000

[b] m (∠ ADC) = 110°

The perimeter Δ BCD = 8 + 6 + 4.1 + 4.1

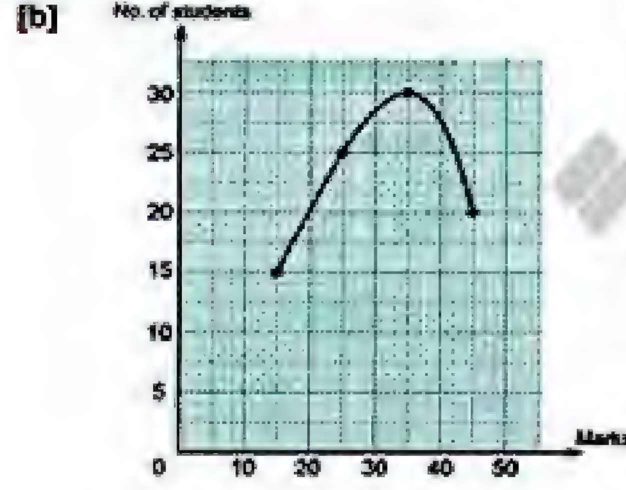
= 22.2 cm.

5 [a] The edge length = 132 ÷ 12 = 11 cm.

The volume = 11 × 11 × 11 = 1 331 cm^3



[b]



6 El-Monofia (2017)

1 [a] 2.8 [b] 75
[c] 20 – X [d] the age

2 [a] 80 [b] 40
[c] equilateral [d] 60°

3 [a] Length in drawing : Length in reality
1 : 1 000
? : 50

The side length in drawing
$= \frac{1 \times 50 \times 100}{1\ 000} = 5$ cm.

The area in drawing $= 5 \times 5 = 25$ cm^2.

[b] The cost = 49 000 + 1 000 = L.E. 50 000

The profit = 55 000 – 50 000 = L.E. 5 000

The percentage of profit $= \frac{5\ 000}{50\ 000} \times 100\ \%$
$= 10\ \%$

4 [a] The edge length = 36 ÷ 12 = 3 cm.

The volume $= 3 \times 3 \times 3 = 27$ cm^3.

[b] Ahmed : Mohamed : Difference
7 : 4 : 3
? : ? : 60

Ahmed's money $= \frac{7 \times 60}{3} =$ L.E. 140

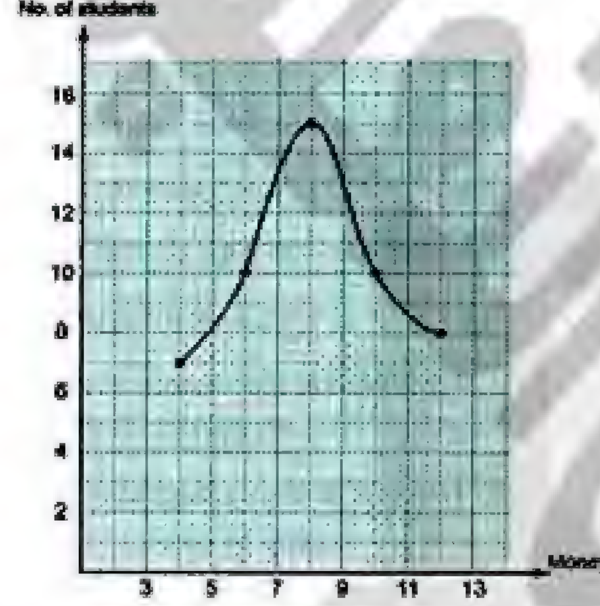
Mohamed's money $= \frac{4 \times 60}{3} =$ L.E. 80

5 [a] The side length of the base = 20 ÷ 4 = 5 cm.

The volume $= 5 \times 5 \times 7 = 175$ cm^3.

[b] (1) 18 students.

(2)



7 El-Gharbia (2017)

1 [a] $\frac{9}{5}$ [b] 27 [c] square [d] 8

2 [a] 70 [b] 10
[c] 1 000 [d] blood type

3 [a] Ahmed : Omar : Sum
9 : 13 : 22
? : ? : 440

The money with Ahmed $= \frac{9 \times 440}{22}$
= 180 pounds.

The money with Omar $= \frac{13 \times 440}{22}$
= 260 pounds.

[b] The height of water $= \frac{10 \times 1\ 000}{25 \times 25} = 16$ cm.

4 [a] Price before discount : Discount : Price after discount
100 % : 10 % : 90 %
? : : 1 800

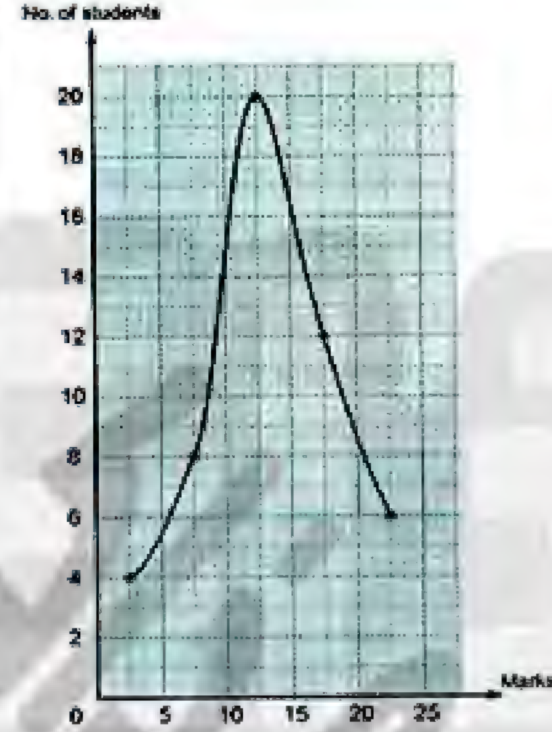
The original price $= \frac{100 \times 1\ 800}{90}$
= 2 000 pounds.

[b] (1) m (∠ ABD) = 70°
(2) m (∠ ADC) = 115°
(3) The perimeter of Δ ABD
= 6 + 8 + 3.5 + 3.5 = 21 cm.

5 [a] Length in drawing : Length in reality
1 : 1 100 000
15 : ?

The real length $= \frac{15 \times 1\ 100\ 000}{1}$
= 16 500 000 cm.
= 165 km.

[b] (1)



(2) 12 students.

8 El-Dakahlia (2017)

1 [a] The volume of the inner space of a hollow solid
[b] 50 [c] 1 : 1 [d] 6

2 [a] age [b] 1000 cm^3
[c] 2 [d] 3

3 [a] Length : Width : Perimeter
7 : 4 : 22
? : ? : 44

The length $= \frac{7 \times 44}{22} = 14$ cm.

The width $= \frac{4 \times 44}{22} = 8$ cm.

The area $= 14 \times 8 = 112$ cm^2.

[b] The depth of the water $= \frac{12 \times 1\ 000}{20 \times 15}$
= 40 cm.

4 [a]

Height	45	?
Shadow length	24	8

The height of the tree $= \frac{45 \times 8}{24} = 15$ m.

[b] (1) m (∠ D) = 100°
(2) m (∠ ACD) = 45°
(3) The perimeter of parallelogram
= 6 + 5 + 6 + 5 = 22 cm.

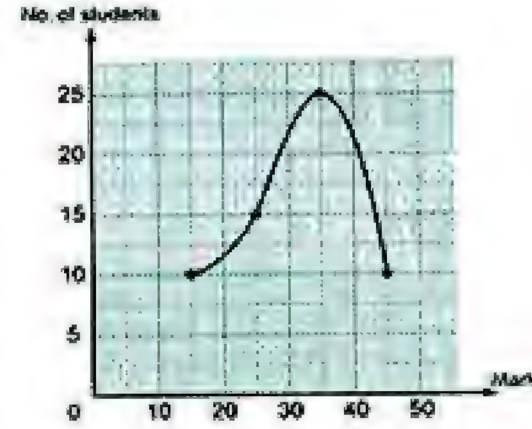
5 [a] The percentage of the remainder
= 100 % – 25 % = 75 %

$\frac{60}{\text{number of notebooks}} = \frac{75}{100}$

The number of notebooks $= \frac{100 \times 60}{75}$
= 80 notebooks

[b] (1) $x = 30$

(2)



9 Ismailia (2017)

1 [a] equal in length [b] 1 : 600
[c] 15 [d] diameter length

2 [a] 3 [b] 6 [c] 36 cm^3 [d] 18

3 [a] The rate = $\frac{45}{5}$ = 9 L.E./day

[b] Buying price : profit : Selling price
100 % : 6 % : 106 %
? : : 3 180

The buying price = $\frac{3\,180 \times 100}{106}$

= 3 000 pounds.

4 [a] The edge length = 40 ÷ 4 = 10 cm.

The volume = 10 × 10 × 10 = 1 000 cm^3.

[b]

1^{st}	:	2^{nd}	:	3^{rd}	:	Sum
50 000	:	40 000	:	30 000	:	(÷ 10 000)
5	:	4	:	3	:	12
?	:	?	:	?	:	36 000

The share of 1^{st} person = $\frac{5 \times 36\,000}{12}$

= 15 000 pounds

The share of 2^{nd} person = $\frac{4 \times 36\,000}{12}$

= 12 000 pounds

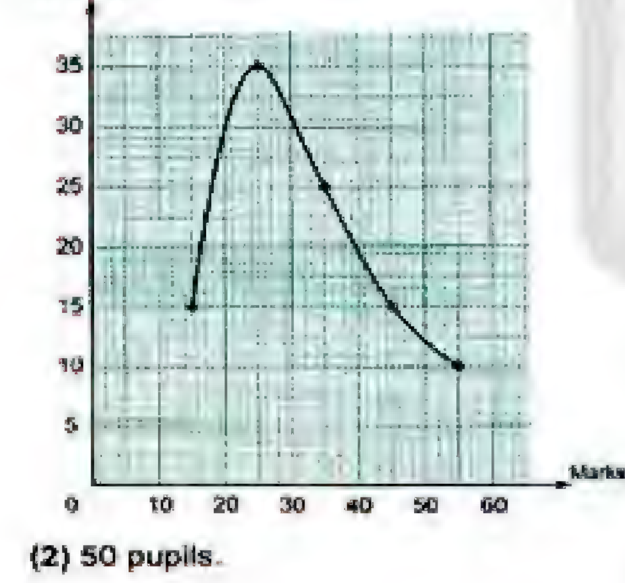
The share of 3^{rd} person = $\frac{3 \times 36\,000}{12}$

= 9 000 pounds

5 [a] (1) m (∠ CAB) = 40°

(2) m (∠ B) = 110°

[b] (1)



(2) 50 pupils.

(10) Suez (2017)

1 [a] 2 : 3 [b] 6

[c] 4 000 [d] rectangle ، square

2 [a] 0.1 [b] L.E. 63 000

[c] 30 cm^3 [d] 6

3 [a] The rate = $\frac{6}{3}$ = 2 feddans/hr.

[b]

1^{st}	:	2^{nd}	:	3^{rd}	:	Sum
3	:	4	:			
	:	2	:	3		
6	:	8	:	12	:	(÷ 2)
3	:	4	:	6	:	13
?	:	?	:	?	:	6 240

The share of the 1^{st} person = $\frac{3 \times 6\,240}{13}$

= L.E. 1 440

The share of the 2^{nd} person = $\frac{4 \times 6\,240}{13}$

= L.E. 1 920

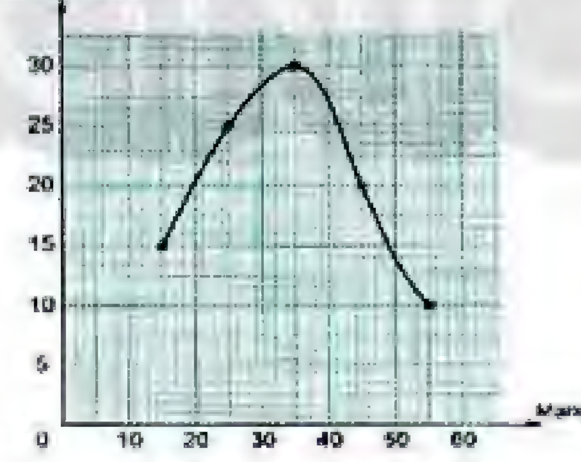
The share of the 3^{rd} person = $\frac{6 \times 6\,240}{13}$

= L.E. 2 880

4 [a] The edge length = 36 ÷ 12 = 3 cm.

The volume = 3 × 3 × 3 = 27 cm^3.

[b]



5 [a] Length in drawing : Length in reality
1 : 900 000
? : 180

The distance on the map

= $\frac{1 \times 180 \times 100\,000}{900\,000}$ = 20 cm.

[b] (1) m (∠ ABC) = 110°

(2) AC = 12 cm.

(3) The perimeter of Δ ABC

= 6.5 + 8 + 12 = 26.5 cm.

(11) Port Said (2017)

1 [a] 0.1 [b] the range [c] edge [d] 1 : 2

2 [a] ∉ [b] 6.7

[c] the favorite colour [d] 90

3 [a] The rate = $\frac{450}{5}$ = 90 L.E./day

[b] The volume of cube = 18 × 18 × 18

= 5 832 cm^3.

The volume of one ingot = 3 × 6 × 9

= 162 cm^3.

The number of ingots = $\frac{5\,832}{162}$ = 36 ingots

4 [a] Buying price : Profit : Selling price
100 % : 15 % : 115 %
? : : 17 250

The buying price = $\frac{100 \times 17\,250}{115}$

= L.E. 15 000

[b] BC = 4 cm. ، m (∠ D) = 115°

، m (∠ ACD) = 40°

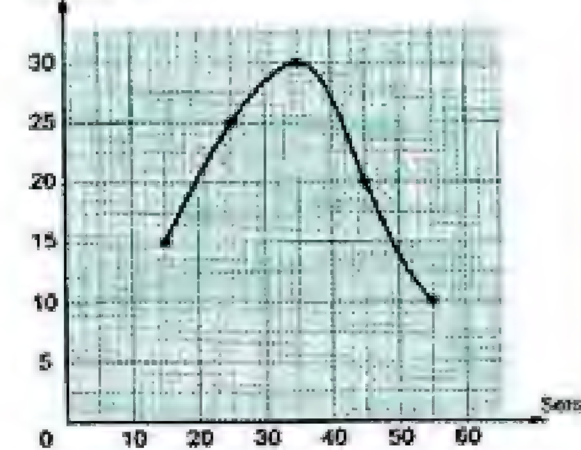
5 [a] Length in drawing : Length in reality
1 : 1 000 000
9 : ?

The real distance = $\frac{9 \times 1\,000\,000}{1}$

= 9 000 000 cm.

= 90 km.

[b] (1)



(2) 40 students.

(12) Dameitta (2017)

1 [a] range [b] rectangle ، square

[c] 12 [d] 27

2 [a] 6.5 [b] 1 : 1 000

[c] 1 : 6 [d] 4

3 [a] 1^{st} building : 2^{nd} building : Difference
4 : 7 : 3
? : ? : 9

The height of 1^{st} building = $\frac{4 \times 9}{3}$ = 12 m.

The height of 2^{nd} building = $\frac{7 \times 9}{3}$ = 21 m.

[b] The volume of water = $\frac{1}{3}$ × 7 × 5 × 9

= 105 m^3.

4 [a]

1^{st}	:	2^{nd}	:	3^{rd}	:	Sum
3	:	4				
		2	:	3		
6	:	8	:	12	:	(÷ 2)
3	:	4	:	6	:	13
?	:	?	:	?	:	6 240

The share of 1^{st} person = $\frac{3 \times 6\,240}{13}$

= L.E. 1 440

The share of 2^{nd} person = $\frac{4 \times 6\,240}{13}$

= L.E. 1 920

The share of 3^{rd} person = $\frac{6 \times 6\,240}{13}$

= L.E. 2 880

[b] Price before discount : Discount : Price after discount

100 % : 15 % : 85 %

? : : 221

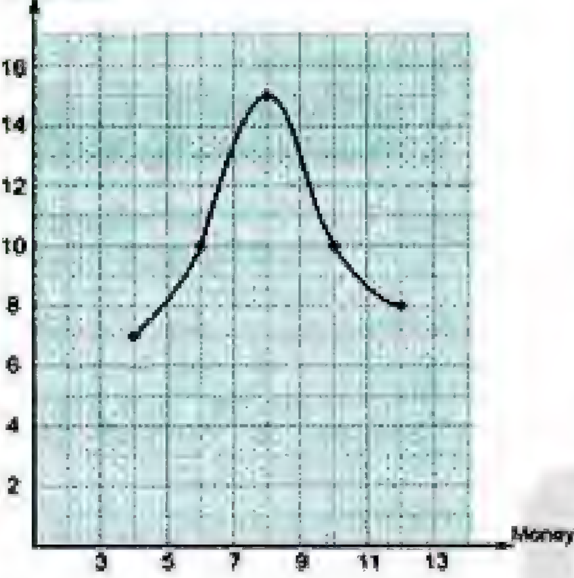
The original price = $\frac{100 \times 221}{85}$ = L.E. 260

5 [a] (1) m (∠ ABD) = 80°

(2) The perimeter fo Δ ACD

= 8 + 5.5 + 6 + 6 = 25.5 cm.

[b] (1)



(2) 18 students.

13 Kafr El-Sheikh (2017)

1 [a] $\frac{1}{2}$ × The base length × The height

[b] 729 [c] 9 : 8 [d] 3

2 [a] 6 [b] 20 : 1 [c] 4 600 [d] age

3 [a] Width : Length : Perimeter

3 : 4 : 14

? : ? : 140

The width = $\frac{3 \times 140}{14}$ = 30 cm.

The length = $\frac{4 \times 140}{4}$ = 40 cm.

The area = 30 × 40 = 1 200 cm^2

[b] C.P. : Profit : S.P.

100 % : 15 % : 115 %

? : ? : 21 275

The cost price = $\frac{100 \times 21\,275}{115}$

= 18 500 pounds.

The profit = $\frac{15 \times 21\,275}{115}$ = 2 775 pounds.

4 [a] 1st brother : 2nd brother : Difference

7 : 5 : 2

? : ? : 80

The share of 1st brother = $\frac{7 \times 80}{2}$ = 280 m^2

The share of 2nd brother = $\frac{5 \times 80}{2}$ = 200 m^2

The area of the land = 280 + 200 = 480 m^2

[b] (1) m (∠ ADC) = 110°

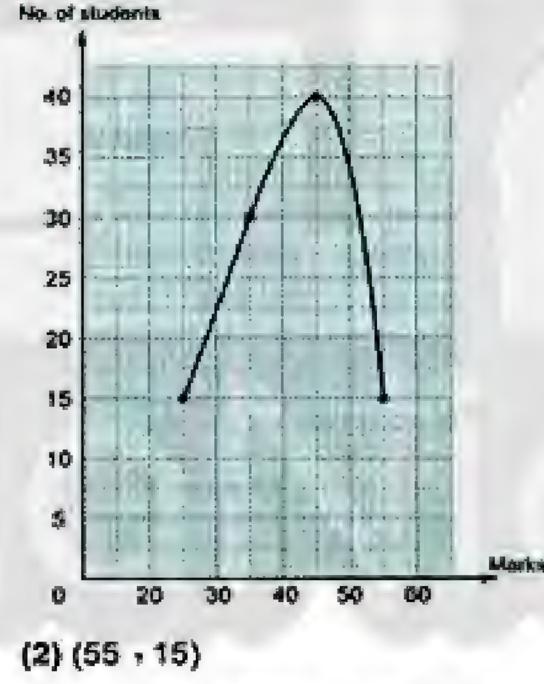
(2) The perimeter of Δ BCD

= 7 + 6 + 3.8 + 3.8 = 20.6 cm.

5 [a] The height of water = $\frac{405}{30 \times 15}$ = 0.9 m.

= 90 cm.

[b] (1)



(2) (55 , 15)

14 El-Beheira (2017)

1 [a] The volume [b] 30°

[c] Square and rhombus [d] the age

2 [a] 5 [b] 3 000 [c] 35 [d] 28

3 [a] The rate of 1st machine = $\frac{500}{2}$ = 250 m/hr.

The rate of 2nd machine $\frac{600}{2\frac{1}{2}}$ = 240 m/hr.

The 1st machine is more efficient.

[b] Length in drawing : Length in reality

1 : 100 000

? : 36 km.

The drawing distance between them

in this atlas = $\frac{1 \times 36 \times 100\,000}{100\,000}$ = 36 cm.

4 [a] The rest = 17 – 5 = 12 kirats

Son : Daughter : Sum

2 : 1 : 3

? : ? : 12

The share of the son = $\frac{2 \times 12}{3}$ = 8 kirats

The share of the daughter = $\frac{1 \times 12}{3}$

= 4 kirats

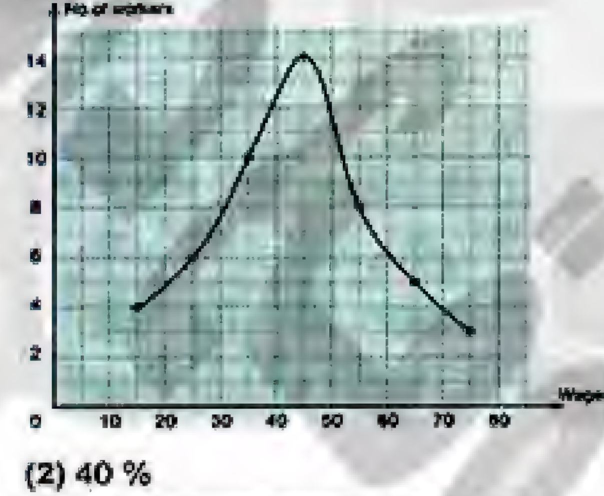
[b] The capacity = 40 × 30 × 1.8

= 2 160 m^3 = 2 160 000 L.

5 [a] The volume of metallic piece

= 30 × 30 × 5 = 4 500 cm^3

[b] (1)



(2) 40 %

15 El-Fayoum (2017)

1 [a] 3 : 2 [b] 180 [c] 8 [d] 40

2 [a] 27 [b] {5}

[c] the birth place [d] 8

3 [a] Length in drawing : Length in reality

1 : 200 000

8 :

The real distance = $\frac{8 \times 200\,000}{1}$

= 1 600 000 cm.

= 16 km.

[b] Buying price : Profit : selling price

100% : 5% : 105%

60 000 : : ?

The selling price = $\frac{105 \times 60\,000}{100}$

= L.E. 63 000

4 [a] Hany : Sherif : Khalid

3 : 5 : 7

24 : ? : ?

The share of Sherif = $\frac{5 \times 24}{3}$ = L.E. 40

The share of Khalid = $\frac{7 \times 24}{3}$ = L.E. 56

[b] The volume of cube = 12 × 12 × 12

= 1 728 cm^3

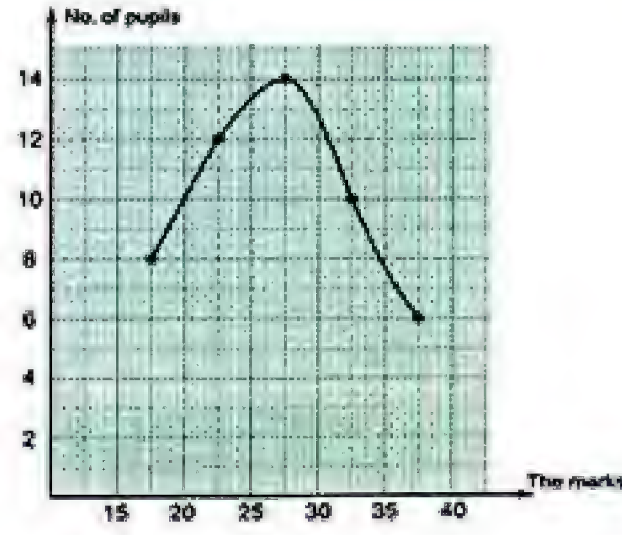
The volume of one alloy = 3 × 4 × 6

= 72 cm^3

The number of alloys = $\frac{1\,728}{72}$ = 24 alloys

5 [a] m (∠ B) = 110° , m (∠ DAC) = 30°

[b]



(16) Beni Suef (2017)

1 [a] length , width [b] 9
[c] 4 , 20 [d] 60

2 [a] 180° [b] 1 : 4
[c] 10 [d] the age

3 [a] The rate = $\frac{1\,000}{4}$ = 250 cans/hr.

[b] Before interest : Interest : After interest
100 % : 10 % : 110 %
9 000 : : ?

The amount of money = $\frac{110 \times 9\,000}{100}$
= L.E. 9 900

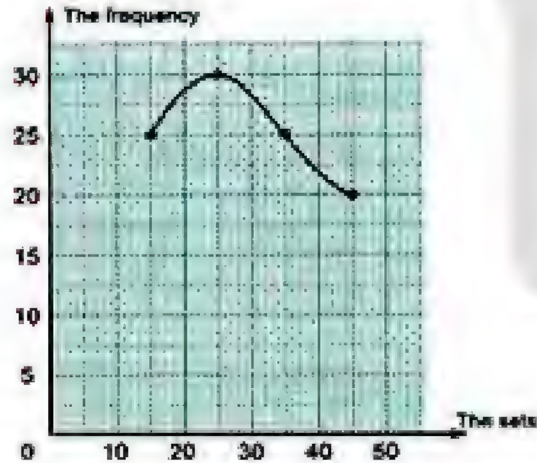
4 [a] The edge length = 36 ÷ 12 = 3 cm.
The volume = 3 × 3 × 3 = 27 cm^3

[b] Length in drawing : Length in reality
1 : 200 000
? : 48 km.

The distance in the atlas
= $\frac{1 \times 48 \times 100\,000}{200\,000}$ = 24 cm.

5 [a] (1) m (∠ C) = 60°
(2) The perimeter of parallelogram ABCD
= 5 + 3 + 5 + 3 = 16 cm.

[b]



(17) El-Menia (2017)

1 [a] 1 : 3 [b] 8 [c] 30 [d] The age

2 [a] rhombus , square [b] 30
[c] 8 [d] 62.84

3 [a] Width : Length : Perimeter
3 : 4 : 14
? : ? : 70

The width = $\frac{3 \times 70}{14}$ = 15 cm.
The length = $\frac{4 \times 70}{14}$ = 20 cm.
The area = 15 × 20 = 300 cm^2.

[b] Length in drawing : Length in reality
1 : 40
? : 160

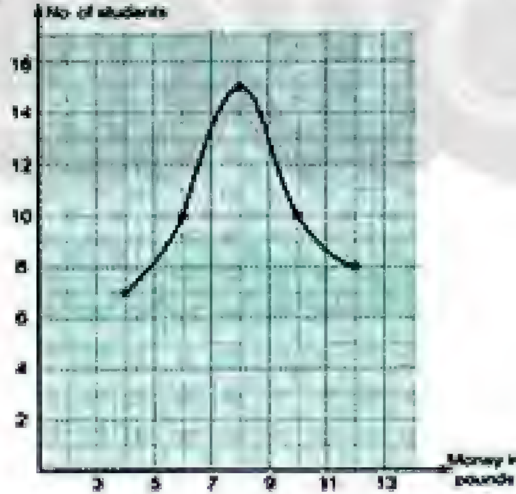
The heigth in the picture = $\frac{1 \times 160}{40}$ = 4 cm.

4 [a] C.P. : Profit : S.P.
100 % : 12 % : 112 %
60 000 : : ?

The selling price = $\frac{112 \times 60\,000}{100}$
= 67 200 pounds.

[b] The volume of big cube = 15 × 15 × 15
= 3 375 cm^3.
The volume of small cube = 3 × 3 × 3
= 27 cm^3.
The number of small cubes
= $\frac{3\,375}{27}$ = 125 cubes.

5 [a] The volume of juice = 6 × 6 × 15 = 540 cm^3.
[b] (1) 33 students.
(2)



(18) Assiut (2017)

1 [a] 28 [b] 6 [c] age [d] 3 : 8

2 [a] 2 [b] square [c] 4 [d] 6

3 [a] 1st piece : 2nd piece : Sum
5 : 9 : 14
? : ? : 126

The length of 1st piece = $\frac{5 \times 126}{14}$ = 45 m.
The length of 2nd piece = $\frac{9 \times 126}{14}$ = 81 m.

[b] Length in drawing : Length in reality
1 : 100
? : 18 m.

The length in the picture = $\frac{1 \times 18 \times 100}{100}$
= 18 cm.

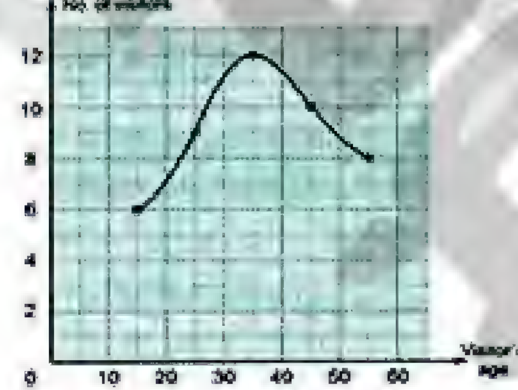
4 [a] (1) The height of water = $\frac{405}{30 \times 15}$ = 0.9 m.
(2) The height of the empty part
= 2 – 0.9 = 1.1 m.
The volume of needed water
= 30 × 15 × 1.1 = 495 m^3.

[b] (1) m (∠ ADC) = 130°
(2) The perimeter of Δ BCD
= 8 + 5 + 6 = 19 cm.

5 [a] 1st brother : 2nd brother : Difference
7 : 5 : 2
? : ? : 80

The share of 1st brother = $\frac{7 \times 80}{2}$ = 280 m^2.
The share of 2nd brother = $\frac{5 \times 80}{2}$ = 200 m^2.
The area of the land = 280 + 200 = 480 m^2.

[b]



(19) Souhag (2017)

1 [a] rectangle , square [b] 1 : 3
[c] 6 [d] 40

2 [a] 2 π r [b] The age [c] $\frac{1}{4}$ [d] 9

3 [a] Length in drawing : Length in reality
1 : 500 000
3 : ?

The real distance = $\frac{3 \times 500\,000}{1}$
= 1 500 000 cm.
= 15 km.

[b] Hany : Samy : Khaled : Sum
30 000 : 40 000 : 50 000 : (÷ 10 000)
3 : 4 : 5 : 12
? : ? : ? : 6 000

The share of Hany = $\frac{3 \times 6\,000}{12}$
= 1 500 pounds.
The share of Samy = $\frac{4 \times 6\,000}{12}$
= 2 000 pounds.
The share of Khaled = $\frac{5 \times 6\,000}{12}$
= 2 500 pounds.

4 [a] The volume of cube = 9 × 9 × 9 = 729 cm^3.
The volume one alloy = 3 × 3 × 1 = 9 cm^3.
The number of alloys = $\frac{729}{9}$ = 81 alloys.

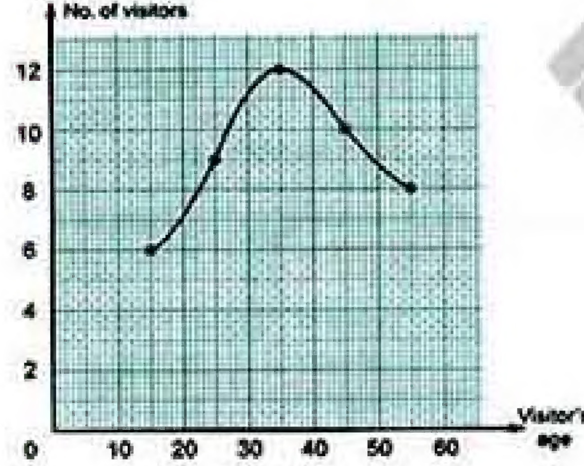
[b] Buying price : Profit : Selling price
100 % : 15 % : 115 %
? : : 23 000

The buying price = $\frac{100 \times 23\,000}{115}$
= 20 000 pounds.

5 [a] (1) m (∠ ADC) = 110°
(2) The perimeter of Δ BCD
= 7 + 6 + 3.8 + 3.8 = 20.6 cm.

[b] (1) 27 visitors.

(2)



20 Qena (2017)

1 [a] blood species [b] square
[c] 40 [d] 4 600

2 [a] 6 [b] 1 : 4 [c] 45 [d] 700 cm^3

3 [a] The rate of 1^{st} tractor = $\frac{6}{3}$ = 2 feddans/hr.
The rate of 2^{nd} tractor = $\frac{10}{4}$
= 2.5 feddans/hr.
The 2^{nd} tractor is more efficiency.

[b] (1) The capacity of the cube = 30 × 30 × 30
= 27 000 cm^3 = 27 litres
(2) The price of oil = 27 × 10
= 270 pounds.

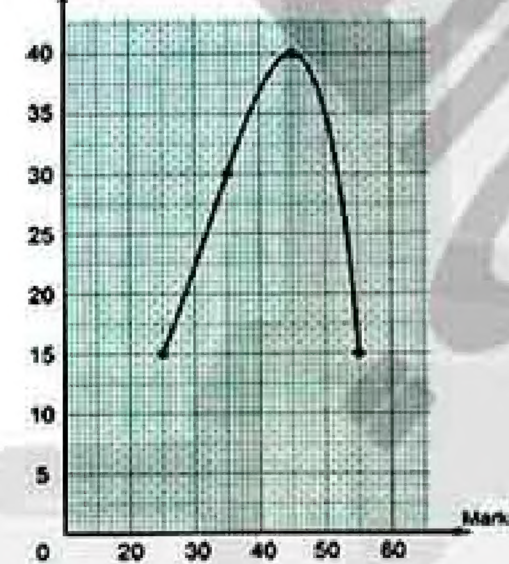
4 [a] Length in drawing : Length in reality
1 : 1 000
3 : ?
The real length = $\frac{3 \times 1\,000}{1}$ = 3 000 cm.
= 30 m.

[b] The volume of cube = 12 × 12 × 12
= 1 728 cm^3
The volume of one ingot = 3 × 4 × 6
= 72 cm^3
The number of ingots = $\frac{1\,728}{72}$ = 24 ingots

5 [a] 1^{st} brother : 2^{nd} brother : Difference
7 : 5 : 2
? : ? : 80
The share of 1^{st} brother = $\frac{7 \times 80}{2}$ = 280 m^2
The share of 2^{nd} brother $\frac{5 \times 80}{2}$ = 200 m^2
The area of the land = 280 + 200 = 480 m^2

[b] (1) 45 pupils.

(2)



21 Luxor (2017)

1 [a] 6 [b] 180° [c] 4 [d] 25 cm^2

2 [a] 2 : 3 [b] the blood type [c] 3 000
[d] rhombus , square

3 [a] Buying price : Loss : Selling price
100 % : 5 % : 95 %
150 000 : : ?
The selling price = $\frac{95 \times 150\,000}{100}$
= L.E. 142 500

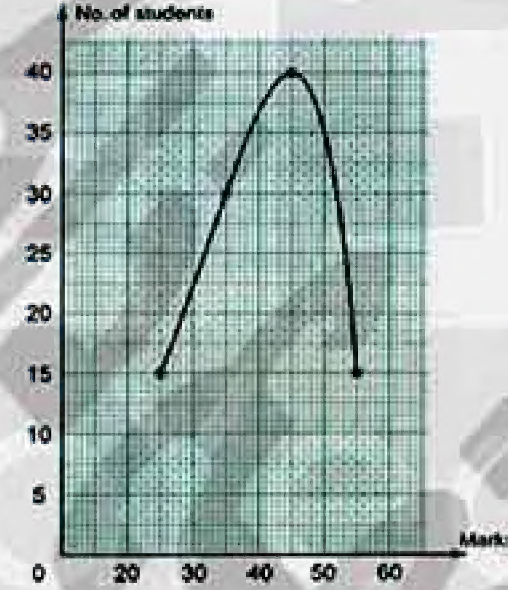
[b] Length in drawing : Length in reality
1 : 1 000
3 : ?
The real height = $\frac{3 \times 1\,000}{1}$ = 3 000 cm.
= 30 m.

4 [a] 1^{st} road : 2^{nd} road : Difference
2 : 5 : 3
? : ? : 21
The length of 1^{st} road = $\frac{2 \times 21}{3}$ = 14 km.
The length of 2^{nd} road = $\frac{5 \times 21}{3}$ = 35 km.

[b] The volume of honey = 20 × 20 × 20
= 8 000 cm^3
= 8 litres.
The price of honey = 8 × 8 = 64 pounds.

5 [a] The volume of cartoon box
= 50 × 40 × 30 = 60 000 cm^3
The volume of a tea box = 10 × 5 × 6
= 300 cm^3
The number of tea boxes = $\frac{60\,000}{300}$
= 200 boxes.

[b] (1)



(2) 45 students.

22 Aswan (2017)

1 [a] 0.5 [b] 1 : 5 [c] square
[d] the favourite colour

2 [a] 5 [b] 48.68 [c] 40 [d] 0.27

3 [a] The profit = 2 640 − 2 400 = L.E. 240
The percentage of profit
= $\frac{240}{2\,400}$ × 100 % = 10 %

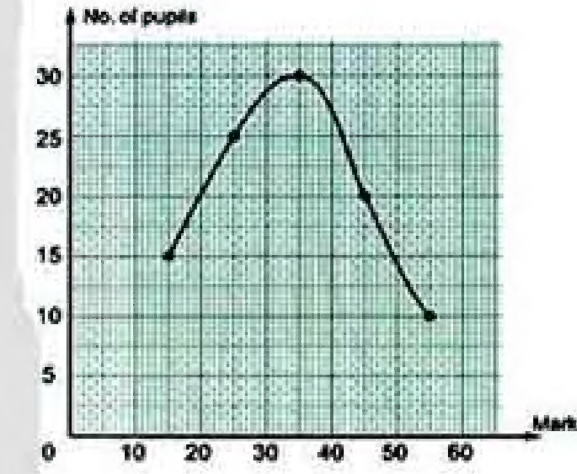
[b] The drawing scale = $\frac{10}{120 \times 100\,000}$
= 1 : 1 200 000

4 [a] The volume = 6 × 6 × 10 = 360 cm^3
[b] m (∠ D) = 118° , m (∠ DAC) = 27°

5 [a] 1^{st} angle : 2^{nd} angle : 3^{rd} angle
5 : 6 : 7
50° : ? : ?
The measure of 2^{nd} angle = $\frac{6 \times 50°}{5}$ = 60°
The measure of 3^{rd} angle = $\frac{7 \times 50°}{5}$ = 70°

[b] (1) 60 pupils.

(2)



23 South Sinai (2017)

1 [a] 3 : 8 [b] rectangle , square
[c] the range [d] 2

2 [a] 6 [b] The age [c] 12 [d] 120

3 [a] The capacity of vessel
= 30 × 30 × 30 = 27 000 cm^3
= 27 litres.

[b] Length in drawing : Length in reality

1 : 9 000 000

? : 180 km.

The distance on the map

$= \frac{1 \times 180 \times 100\,000}{9\,000\,000} = 2$ cm.

4 [a] Buying price : Profit : Selling price

100 % : 6 % : 106 %

? : : 3 180

The buying price $= \frac{100 \times 3\,180}{106} =$ L.E. 3 000

[b] Boys : Girls : Sum

4 : 5 : 9

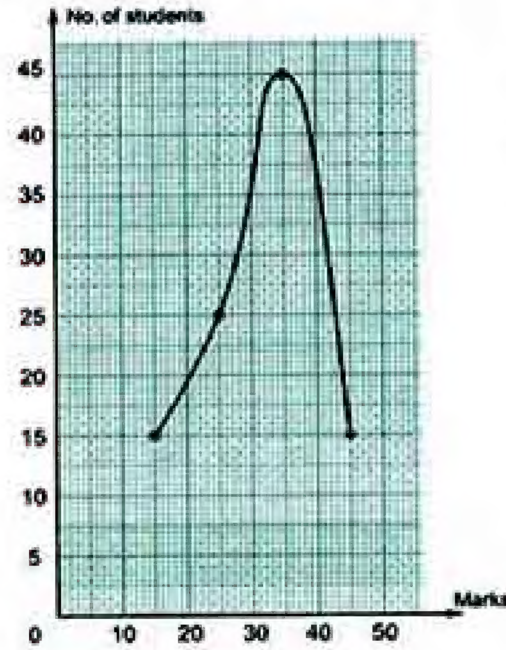
? : ? : 540

The number of boys $= \frac{4 \times 540}{9} = 240$ boys

The number of girls $= \frac{5 \times 540}{9} = 300$ girls

5 [a] The volume of a cuboid = 16 × 9 = 144 cm³

[b]



24 Red Sea (2017)

1 [a] 4.2 [b] 6 [c] 125 [d] The age

2 [a] rhombus , square [b] 20

[c] 500 [d] 6

3 [a] 1st lorry : 2nd lorry

600 kg. : 1.5 ton

"1.5 ton = 1.5 × 1 000 = 1 500 kg."

600 kg. : 1 500 kg.

600 : 1 500 (÷ 100)

6 : 15 (÷ 3)

2 : 5

[b] Length in drawing : Length in reality

1 : 1 100 000

15 : ?

The real length $= \frac{15 \times 1\,100\,000}{1}$

= 16 500 000 cm.

= 165 km.

4 [a] Buying price : Profit : Selling price

100 % : 10 % : 110 %

? : : 2 200

The buying price $= \frac{100 \times 2\,200}{110}$

= L.E. 2 000

[b] The height $= \frac{4\,800}{240} = 20$ cm.

5 [a] (1) m (∠ D) = 120°

(2) m (∠ BAC) = 35°

(3) AD = 6 cm.

[b]



25 Matrouh (2017)

1 [a] edge length × edeg length × edge length

[b] 175 [c] 1 [d] the range

2 [a] 6 [b] ∈ [c] 180° [d] the age

3 [a] 1st road : 2nd road : Difference

2 : 5 : 3

? : ? : 21

The length of 1st road $= \frac{2 \times 21}{3} = 14$ km.

The length of 2nd road $= \frac{5 \times 21}{3} = 35$ km.

[b] Buying price : Profit : Selling price

100 % : 15 % : 115 %

? : ? : 41 400

The buying price $= \frac{100 \times 41\,400}{115}$

= L.E. 36 000

The profit $= \frac{15 \times 41\,400}{115} =$ L.E. 5 400

4 [a] The number of bottles $= \frac{12 \times 1\,000}{400}$

= 30 bottles

[b] (1) m (∠ ABD) = 82°

(2) m (∠ D) = 127°

(3) AC = 12 cm.

5 [a] Length in drawing : Length in reality

1 : 500

2 : ?

The first dimension in reality

$= \frac{2 \times 500}{1} = 1\,000$ cm. = 10 m.

Length in drawing : Length in reality

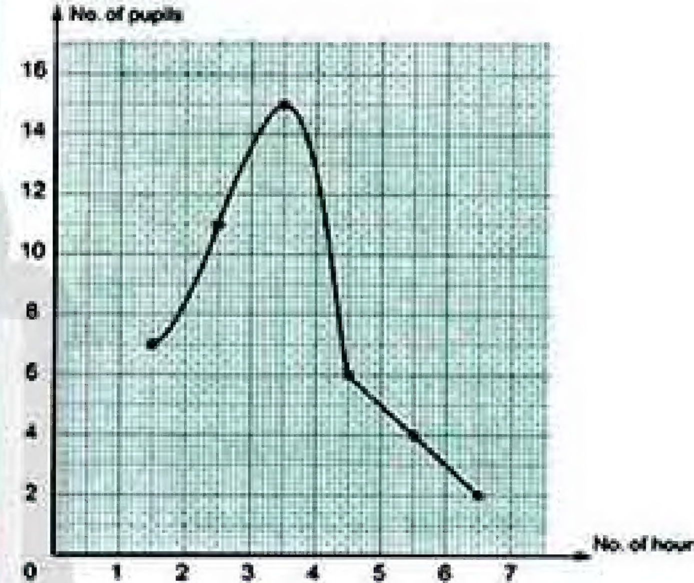
1 : 500

4 : ?

The second dimension in reality

$= \frac{4 \times 500}{1} = 2\,000$ cm. = 20 m.

[b]



Answers of Governorates Examinations for the Year 2016

1 Cairo (2016)

1 [a] 1 : 2 [b] 75 [c] 4 [d] 62°

2 [a] 12 [b] nationality
[c] 2 [d] 90

3 [a] Length in drawing : Length in reality
1 : 1 100 000
15 : ?

The real length = $\frac{15 \times 1\,100\,000}{1}$
= 16 500 000 cm.
= 165 km.

[b]

1st	:	2nd	:	3rd	:	Sum
60 000	:	80 000	:	90 000	:	(+ 10 000)
6	:	8	:	9	:	23
?	:	?	:	?	:	20 700

The share of the 1st person
= $\frac{6 \times 20\,700}{23}$ = L.E. 5 400

The share of the 2nd person
= $\frac{8 \times 20\,700}{23}$ = L.E. 7 200

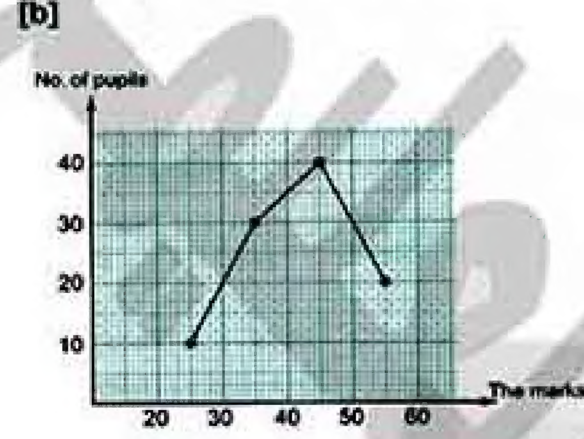
The share of the 3rd person
= $\frac{9 \times 20\,700}{23}$ = L.E. 8 100

4 [a] The profit = 130 000 − 100 000 = L.E. 30 000
The percentage of profit
= $\frac{30\,000}{100\,000} \times 100\,\% = 30\,\%$

[b] (1) 120°
(2) The perimeter of Δ XLZ
= 3 + 5 + 7 = 15 cm.

5 [a] The number of bottles = $\frac{12 \times 1\,000}{400}$
= 30 bottles.

[b]



2 Giza (2016)

1 [a] 18 [b] 27 [c] 1 : 4 [d] 6

2 [a] 750 [b] 8
[c] age [d] rectangle

3 [a] The volume = 12 × 10 × 8 = 960 cm^3.

[b] Buying price : Profit : Selling price
100 % : 15 % : 115 %
? : ? : 21 520

The buying price = $\frac{100 \times 21\,520}{115}$
= L.E. 18 713 $\frac{1}{23}$

The profit = $\frac{15 \times 21\,520}{115}$ = L.E. 2 806 $\frac{22}{23}$

4 [a] The drawing scale = $\frac{10 \times 10}{2}$ = 50 : 1

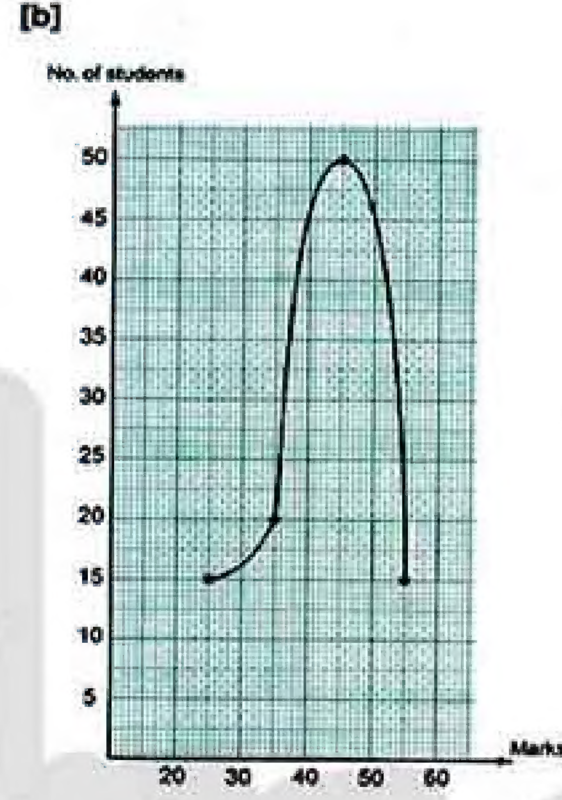
[b]

1st	:	2nd	:	3rd	:	Sum
2	:	3	:		:	
	:	4	:	5	:	
8	:	12	:	15	:	35
?	:	?	:	?	:	280

The share of the 1st merchant
= $\frac{8 \times 280}{35}$ = 64 kg.
The share of the 2nd merchant
= $\frac{12 \times 280}{35}$ = 96 kg.
The share of the 3rd merchant
= $\frac{15 \times 280}{35}$ = 120 kg.

5 [a] (1) 60° (2) 120°
(3) The perimeter of the parallelogram
ABCD = 5 + 7 + 5 + 7 = 24 cm.

[b]



3 Alexandria (2016)

1 [a] 220 , 12 [b] 50
[c] 4 630 [d] number of sets

2 [a] 5 [b] the favourite colour
[c] 2 : 5 [d] 5

3 [a] Length : Width : Perimeter
7 : 4 : 22
? : ? : 44

Length = $\frac{7 \times 44}{22}$ = 14 m.

Width = $\frac{4 \times 44}{22}$ = 8 m.

The area of rectangle = 14 × 8 = 112 m^2.

[b] The volume = $\frac{1}{3} \times 7 \times 5 \times 9 = 105\ m^3$.

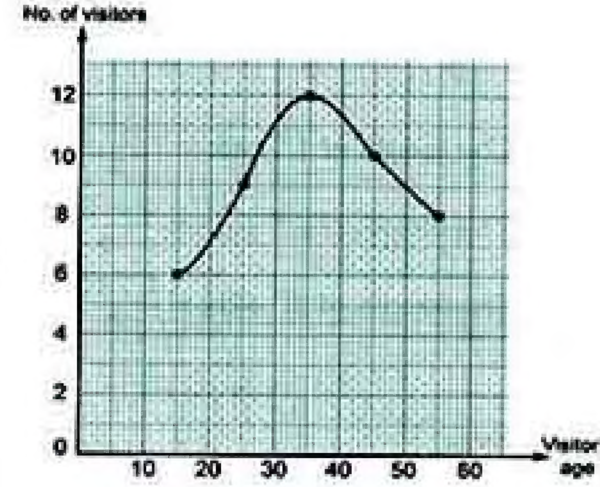
4 [a] The rate of 1st machine = $\frac{500}{2}$ = 250 m./hr.
The rate of 2nd machine = $\frac{600}{2.5}$ = 240 m./hr.
The first machine is more efficient than the second machine.

[b] Buying price : Profit : Selling price
100 % : 14 % : 114 %
? : : 1 026

The buying price = $\frac{100 \times 1\,026}{114}$
= 900 pounds.

5 [a] The volume of the big cube = 8 × 8 × 8
= 512 cm^3.
The volume of a small cube = 2 × 2 × 2
= 8 cm^3.
The number of small cubes = $\frac{512}{8}$
= 64 cubes.

[b] (1) 27 visitors.
(2)



4 El-Kalyoubia (2016)

1 [a] 1 : 2 [b] 40
[c] 5 [d] $\frac{\text{length in drawing}}{\text{length in reality}}$

2 [a] 30° [b] 750 cm^3.
[c] 12 [d] age

3 [a] The rate = $\frac{240}{3}$ = 80 km./hr.

[b] Before interest : Interest : After interest
100 % : 8 % : 108 %
20 000 : : ?

The total amount = $\frac{108 \times 20\,000}{100}$
= L.E. 21 600

4 [a] Length in drawing : Length reality

200	:	1
?	:	1.2

The length in the picture = $\frac{200 \times 1.2}{1}$ = 240 mm. = 24 cm.

[b] The volume of the box = 30 × 25 × 15 = 11 250 cm^3

The volume of a piece of sweet = 6 × 5 × 3 = 90 cm^3

The number of pieces of sweets = $\frac{11\ 250}{90}$ = 125 pieces.

5 [a] 1st side : 2nd side : 3rd side : Sum

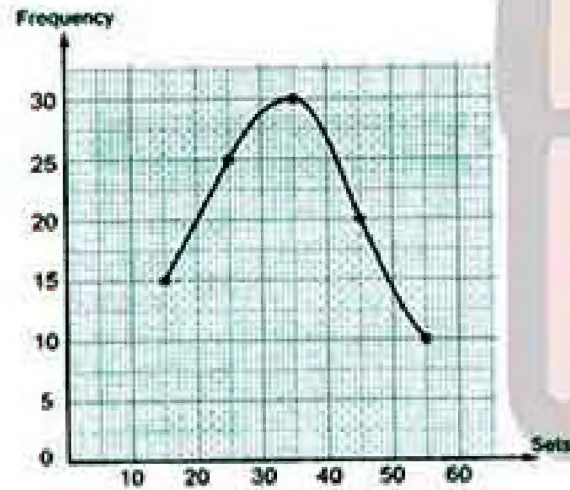
2	3	4	9
?	?	?	108

The length of 1st side = $\frac{2 \times 108}{9}$ = 24 cm.

The length of 2nd side = $\frac{3 \times 108}{9}$ = 36 cm.

The length of 3rd side = $\frac{4 \times 108}{9}$ = 48 cm.

[b]



5 El-Sharkia (2016)

1 [a] $\frac{2}{5}$ [b] 2 000 [c] 9 [d] the weight

2 [a] 4 : 3 [b] 0.27 [c] 180° [d] 40

3 [a] 1st angle : 2nd angle : 3rd angle : Sum

1	2	3	6
?	?	?	180

The measure of 1st angle = $\frac{1 \times 180}{6}$ = 30°

The measure of 2nd angle = $\frac{2 \times 180}{6}$ = 60°

The measure of 3rd angle = $\frac{3 \times 180}{6}$ = 90°

The triangle is a right-angled triangle.

[b] Length in drawing : Length in reality

1	:	1 100 000
15	:	?

The real length = $\frac{15 \times 1\ 100\ 000}{1}$ = 16 500 000 cm. = 165 km.

4 [a] Buying price : Profit : Selling price

100 %	12 %	112 %
?		2 688

The buying price = $\frac{100 \times 2\ 688}{112}$ = L.E. 2 400

[b] m (∠ B) = 110° , m (∠ DAC) = 30°

5 [a] The volume = 6 × 6 × 15 = 540 cm^3

[b]

